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ABSTRACT

This planning document defines the computing needs of the College of DuPage for the 1988 to 1990 fiscal years and provides the strategic direction necessary to keep the college in step with technological advancements. The plan is divided into the following major sections: (1) the "Introduction" describes the major issues that will impact computing in higher education in the future; (2) "The Planning Process" explains how surveys were administered to solicit input and suggestions from user groups and describes the structure and responsibilities of the five planning committees; (3) "Current Environment" examines the college's current computer systems and facilities; (4) "Academic Computing" focuses on student usage, hardware needs, software needs, support needs, and action plans and financial considerations; (5) "Administrative Computing" looks at the information processing services which provide college management with the data necessary to make decisions, record data, and carry out the day-to-day operations; (6) "Central Computing" evaluates governance, systems software, systems hardware, communications, and networking for central computing, and makes appropriate recommendations; and (7) "Summary Recommendations and Financial Considerations," provides a concluding summary and describes special financial issues. Appendices include academic and administrative surveys, the community college survey, the institutional planning process, a computer services organizational chart, an institutional organizational chart, and a computer resources schematic. Seventy-five figures illustrate the text. (EJV)

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COLLEGE OF DUPAGE INSTITUTIONAL PLAN FOR COMPUTING FY88 - FY90

June 3rd, 1987

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JC 880 092

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June 3rd, 1987

Preface

This document represents the results of our concerted efforts over a period of 18 months. Although a substantial amount of data was collected in our research efforts, we have struggled to make it as coherent and easy to read as possible.

This document is divided into the following major sections:

- "Introduction" describes the major issues that will impact computing in higher education in the future.
- "The Planning Process" describes how we used surveys and suggestions from both general and *ad hoc* committees to develop a plan meaningful to the college as a whole.
- "The Current Environment" describes the current computer environment in terms of computer support and computer systems and facilities.
- "Academic Computing" describes computer usage in the major instructional areas of the college as it was identified in the surveys, and makes appropriate action plans and financial consultations in terms of hardware, software, and support needs.
- "Administrative Computing" evaluates administrative computing on campus and makes appropriate action plans and financial consultations in terms of software, support, and hardware needs.
- "Central Computing" evaluates governance, systems software, systems hardware, communications, and networking for central computing; and makes appropriate recommendations.
- "Summary Recommendations and Financial Considerations" summarizes all recommendations made for academic, administrative, and central computing; and describes special financial considerations.

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This project could not have been completed without the patience, skill, talent and inspiration of the following people:

- Writers: Rod Gualtieri, Manager Academic Computing
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INTRODUCTION

There are many issues today and in the future that will affect higher education. New technologies will have a tremendous impact on how we teach, manage, and administer an educational institution. Planning for computing will provide the institution an organized approach to meeting the challenges of today and the future.

One of the most comprehensive summaries of computing on college campuses is in a book called *Campus Computing Strategies*, by Dr. McCredie. He provided a summary of themes from ten major colleges and universities across the country that will impact computing in higher education in the future.

- The United States is fast becoming an information-based economy, and computer technology is central to this movement. Information-based activities now account for almost half of the gross national product.

- More students each year are demanding courses in the information processing fields. The number of undergraduate majors in computer science doubled between 1975 and 1981. Before the end of the decade almost every student, not just those in computer fields, will expect the full range of computer-related services to be available at colleges and universities.

- Computer applications will grow rapidly in new areas as the relative costs of automated and human information processing continue to shift dramatically. The price of computer hardware will continue to decline during the next ten years, at a compound yearly rate of approximately 25 percent. In contrast, the cost of a technical person or faculty member will increase by 75 percent.

- Trained information processing professionals (faculty, analysts, programmers, technicians, etc.) will be more expensive, harder to recruit and more difficult to retain than they are now or were in the past. Salary policies will make these problems more severe in education and non-profit sectors of the economy than in the business sector.

- The rapid development and spread of microcomputers is accelerating the decentralization of computing resources on campuses. Students and faculty will have personal systems. These owners will require ways to link their systems to other microcomputers and to large local and campus facilities for access to data, large storage capacity, high-quality printing capabilities, and communications with other scholars.

- Libraries and computer centers will draw closer together. Similarities in information processing functions and needs are emerging and will become more important than historical differences in organization.

- Nationwide discipline-based networks will draw geographically dispersed academic communities together in new ways.

- Administrative computing in general is much more difficult and costly than most university administrators believe. About half of total academic computing expenditures are for administrative data processing applications. Ten years ago administrative computing accounted for only about 34 percent of the total.

- Instructional computing is funded at an inadequate level. Large capital investments are required from an educational system that has traditionally been people, rather than capital, intensive.

A 1986 publication by CAUSE called *Computing Strategies* identified the major trends which will affect computing on campuses.

- The declining cost of computer hardware
- Increased demand for computer-related education
- Communications between computers and computer-related equipment
- Development/acquisition of computer software
- Increased demand for decentralized computing
- Shortage of professionals, both faculty and support staff
- Financing of the demand for additional computing resources
- Direction of all computer services by one individual
- Increased library computerization

What are the organizational implications of new technology?

> Whether or not information technologies are unique, the demands they place on academic institutions are clearly proliferating at a quickening pace. Therefore, the argument as to how higher education must create new strategies for information processing activities in the next decade is, in part, a very practical one. Such strategies are central to the convergence of several related campus activities that use new technologies in instruction, research, administration, telecommunications, mail, printing, institutional planning, and library services. The integration of part of these activities for capital planning purposes and priority setting will be sound business policy because of the great potential for waste if they are handled separately.
>
> The information processing challenges and opportunities presented by these changes are profound, particularly for higher education, because most institutions are unprepared to deal with them effectively. Most seem oblivious to the challenge. Most institutions have made plans to react to the demographic changes of the 1980s, but only a few have strategies to face the inevitable technological changes on the horizon. If these changes are not planned for, the opportunity cost to all of higher education will be very large.---*Campus Computing Strategies*

Over the next decade the College of DuPage will face the above problems and other new challenges. The competition for retaining current students and attracting new students will grow. The demands for new educational services particularly in the use of computers in most disciplines will need to be satisfied. We need to plan for computing at the College of DuPage to address all the administrative and academic computing needs.

The mission for the College of DuPage is to provide educational opportunities of the highest quality for people of any race, creed, gender, or national origin who want to improve their vocational and avocational skills, or enjoy cultural or recreational activities. In order to provide the educational training through most disciplines, computing is or will be an integral part of each instructional area.

This document will address the computing needs of the institution for the next three years and provide the strategic directions necessary to keep the college in step with technology to take advantage of future advancements. This will allow us to be more efficient and effective with the current resources while satisfying the future needs of the institution.

THE PLANNING PROCESS

Overview

An integral part of any successful planning process must be the conscientious contribution to the plan by all its constituents. Management or individual attempts to impose a college computing plan which has not taken into consideration the needs, constraints, and objectives for all areas of the college must certainly be doomed to failure. To avoid such errors, and to make our plan meaningful, we employed carefully constructed surveys and heeded suggestions from general and *ad hoc* committees. These surveys and committees are described in the following sections.

Surveys

After designing literally hundreds of questions to solicit the most complete and meaningful data possible, we generated five surveys: the Academic Computing Survey, the Administrative Users Survey, the Administrative Computing Departmental Survey, the Academic Computing Departmental Survey, and the Community College Survey.

Academic Computing Survey

The Academic Computing Survey was generated to provide faculty a method of contributing to the plan. The survey provided data on the following areas:

- Priority on the type of computer hardware
- Priority on the type of computer software
- Level of support needed on use of computers
- Level of support provided on the use of computers
- List of most important computing areas
- Incentives needed to use computers

Refer to Appendix A for a sample of the Academic Computing Survey.

Administrative Users Survey

The Administrative Users Survey was generated to include provisions in the plan for institution employees who use the computer or employees needing access to computers. Results of the survey helped answer the following questions:

- What computer resources are used
- How frequently the computer resources are used

- How satisfied are the users with the computer resources
- What computer resources, including computer hardware and software, we may need in the future
- What support services you may need in the future
- What types of training are needed

Refer to Appendix B for a sample of the Administrative Users Survey.

Administrative Computing Departmental Survey

The Administrative Computing Departmental Survey generated responses from each dean/director regarding their departmental administrative computing needs. The Executive Director of Computer Services and/or the Manager of Information Support Services interviewed each dean/director. The survey provided the following information:

- Computer equipment needed to provide adequate support over the next three years
- Projected growth of existing administrative applications
- New computer applications that are needed to replace manual operations
- Level of support received from personnel in Computer Services
- The future computer support areas such as graphics, electronic mail, etc.
- Connectivity needs - does information from your current system need to be sent to another computer system on campus

Refer to Appendix C for a sample of the Administrative Computing Departmental Survey.

Academic Computing Departmental Survey

The Academic Computing Departmental Survey generated feedback from the deans and associate deans of each division. The Executive Director and/or the Manager of Academic Computing interviewed each dean, associate and/or assistant dean. The survey provided the following information:

- Current and projected student usage of computers
- Faculty use of computers
- Current and future software budget needs
- Division responsible for computer labs provided information on plans for expansion
- Computer support from personnel in Computer Services
- New academic computer applications

Refer to Appendix D for a sample of the Academic Computing Departmental Survey.

Community College Survey

One method of evaluating computing resources at the College of DuPage is to compare some of the data collected at the College of DuPage with other colleges both in and out of Illinois. Information for the comparison was collected through a survey (Appendix E) sent to six community colleges and one four-year college. The Community College Survey has provided for the following comparisons:

- A comparison of the percent of students using computers for each of the colleges
- A comparison of the number of students using microcomputer, minicomputer and mainframe computer resources
- A comparison of the number of student users to the number of stations as an index of the access students have to computer resources
- A comparison of the number of microcomputer stations available for faculty use and the ratio of full-time faculty to available microcomputers
- A comparison of the levels of support provided to faculty and students. The level of support was calculated as the ratio of FTE (Full Time Employee) support staff per number of faculty or students who use computers
- Staffing levels for academic and administrative computing
- Reporting structures
- Budget information for computing

The surveys provided precise and accurate information about the current computing on campus, and the future needs for both instructional and administrative areas of the college. Refer to Appendix E for a sample of the Community College Survey.

Committees

Five committees focused our view of the college impetus, and contributed suggestions and reviews for the planning process:

- Academic Divisional Computer Committee - ADCC
- Academic Computer Planning Committee - ACPC
- Administrative Review Committee - ARC
- Administrative Systems Users Advisory Committee - ASUAC
- Computer Services Management Committee - CSMC

Academic Divisional Computer Committee - ADCC

Each academic division identified three to five faculty members involved in computing. These members served on the Academic Divisional Computer Committee to address computing needs. Their responsibility was to:

- Define long range computing objectives
- Define the importance of the computing objectives to the instructional process
- Collect information from the division and incorporate the information into a computing plan for the division
- Provide a divisional plan to the ACPC committee which identified anticipated and projected new computer use and direction for computing at the divisional level

Academic Computer Planning Committee - ACPC

The Academic Computing Planning Committee consisted of faculty representatives of each academic division, two academic deans and the Manager of Academic Computing. The charge of the

committee was to gather and evaluate information as provided by the Divisional Committee and Computer Services and use this information to:

- Define the current computing environment
- Evaluate computer resources and support
- Make suggestions on how to improve computing
- Define academic computing needs and objectives for the college
- Review of ongoing divisional computing needs

Administrative Review Committee - ARC

The Administrative Review Committee consisted of Deans and the Executive Director Computer Services. This committee reviewed the information provided by the ACPC and provided a higher level review of the proposal. The committee was responsible for:

- Reviewing the divisional needs
- Providing additional input on divisional needs
- Recommending a priority of the needs
- Reviewing goals and objectives

Administrative Systems Users Advisory Committee - ASUAC

The Administrative Systems Users Advisory Committee consisted of major computer users and director/dean level representatives from the five administrative units (Central Campus, Open Campus, Administrative Affairs, External Affairs, and Planning and Information) as well as the Executive Director, Manager Administrative Systems, and Manager Information Support Services from Computer Services. The committee was responsible for:

- Reviewing and prioritizing all administrative programming requests
- Providing input from their units on computing needs for hardware, software and support
- Providing input on future computing needs
- Formulating the Administrative Computing Plan
- Evaluating the Administrative Computing Plan
- Reviewing ongoing unit needs

Computer Services Management Committee - CSMC

The Computer Services Management Committee consists of the President, Vice President Planning and Information, Vice President Administrative Affairs, Vice President External Affairs, Provost Main Campus, Provost Open Campus, and the Executive Director Computer Services. The committee was responsible for:

- Reviewing the academic planning recommendations
- Reviewing the administrative planning recommendations
- Reviewing the future direction recommendation
- Recommending priorities

- Recommending funding levels to the Board of Trustees

Final funding decisions for the Institutional Plan for Computing will be made by the Board of Trustees during its review.

Appendix F shows the organization of the planning committees for both the administrative and academic computing planning processes.

CURRENT ENVIRONMENT

Overview

The current environment for computing at the College of DuPage consists of computer support (that is, people) and computer systems and facilities (that is, hardware and software). A proper ratio of computer support, hardware and software is necessary for maximum operational efficiency. The following sections evaluate the current environment in terms of computer support and computer systems and facilities.

Computing Support

In order for computing to be successful and grow, computer literacy must grow. As literacy grows so does the support for computing. The following sections describe the five areas of the college that currently support computing on campus: Computer Services, Instructional Design, the Learning Resource Center, the instructional divisions, and Open Campus.

Computer Services

Computer Services provides personnel to assist students, faculty, and staff who may be working with computers, learning about computers, or considering the purchase of computers. Computer Services is divided into five departments: Information Support Services, Administrative Systems, Academic Computing, Technical Support Services, and Computer Operations.

Each department provides a special function to the institution and only those areas can provide the support. The following figure shows the current support for each functional area by full time, part time and total FTE's.

AREA	*FULL-TIME*	*PART-TIME*	*TOTAL*
Executive Director's Office	3.0	.50	3.50
Information Support Services	3.0	.50	3.50
Administrative Systems	9.0	.50	9.50
Academic Computing	4.0	12.60	16.60
Technical Support Services	3.0	0.00	3.00
Computer Operations	7.0	.75	7.75
	29.0	14.85	43.85

Figure 1. Computer Services Staff Support in FTE's

There are 29 full-time employees in Computer Services. All departments except Computer Operations hire students to assist with the work load. In Academic Computing, about 26 part-time students provide support for the computer labs.

Appendix I shows a complete organizational chart of Computer Services. The following sections briefly describe responsibilities of each department.

Information Support Services

Information Support Services is responsible for administrative end user computing. This includes technical training and seminars, documentation for current and new systems, maintenance of a technical reference library, development end user applications, review of all computer equipment and review of administrative software requests.

Administrative Systems

Administrative Systems is responsible for new programming, modification of existing programs, correction of existing programs, and implementation and support of new systems development for the user administrative functions of the college. This includes the major online and batch systems, such as student records, billing, financial aid, human resource system, general ledger system and inventory.

Academic Computing

Academic Computing is responsible for the educational application of the computer for instruction. This includes support for use of computers by students in combination with a curriculum of study, use of the computer by faculty as an aid to instruction, development of new applications, and the selection and use of instructional software for all systems. This area also manages several computer labs on campus.

Technical Support Services

Technical Support Services is responsible for the integrated use of mainframe computer hardware, system software and communication facilities. This includes the installation, maintenance, and integration of the operating systems (hardware and software), planning and development of system requirements, the development and implementation of standards for security, data integrity and data base.

Computer Operations

Computer Operations is responsible for the actual operation and maintenance of the computer equipment, production schedules for the application systems, and data entry for input needed in the application system. This includes operations support for the IBM 4381, DEC VAX 751, HP 3000, PDP 11/34 and NCS 7008 scanner.

Instructional Design

The Office of Instructional Design works with the college community to assist in the improvement of instruction. Through its support of faculty projects, the OID facilitates the process of adopting new instructional technologies.

In its support of computer-assisted instruction, the Office of Instructional Design provides non-teaching assignments, management, coordination and design assistance. Currently its activities include analysis of instructional software and assessment of hardware for potential instructional applications. The office assists by sharing information with faculty and staff on new trends in computer-based instruction and by providing in-service workshops on these new instructional technologies. In fulfilling its mission, the Office of Instructional Design works closely with Computer Services and other college offices.

Learning Resource Center

The Learning Resource Center provides personnel to assist faculty and students in the use of the Instructional Micro Classroom which includes scheduling of the lab, software distribution, hardware maintenance, and assistance in using computers. Faculty support includes the identification and demonstration of new microcomputer applications, the evaluation of pre-packaged software, the integration of software into the lab, and computer training. The Learning Resource Center provides for the development and distribution of computer support materials. The Lab Supervisor is responsible for the evaluation of requests to make use of the cluster system and the housekeeping of software stored on the hard disk.

The Learning Resource Center also provides Macintosh microcomputers for the development of written and graphically displayed instructional materials.

Instructional Divisions

Faculty support each other in the use of computers and have initiated computer training with applications in their areas of specialty. For example, word processing training has been initiated by Humanities faculty; integrated software training, by Data Processing faculty; and computer-aided design training, by Technology faculty. Some divisions share responsibility for the management and use of a computer lab located in their area (i.e., Business and Services and Office Careers share responsibility for the microcomputer and Wang lab; Technology, for the Intergraph CAD lab; and Natural Sciences and Engineering for the Engineering Graphics lab). Student use of computers is partially supported by lab aides stationed in each computer lab and ultimately by the instructor who is teaching the computer-related course. Student use of dedicated systems are also supported by faculty because of the highly specialized nature of these applications. These include:

- The proposed Lumina system for Commercial Art
- The Macintosh system for graphic arts
- The Numerical Control system for manufacturing technology
- The Amiga system for photography
- The CLSI system for library technology
- The Fox/Zenith computer for digitial electronics

Open Campus

Student use of the BPI microcomputer labs in support of the Data Processing program and the Regional Assistance Center is supported by individual instructors. The lab is managed by one lab supervisor and a program manager for the Data Processing area. Computer use in the Learning Lab is supported by individual instructors or instructional aides stationed in the lab. Part-time faculty support the use of computers at off-campus locations. Computer systems located at each each of the three regional centers are supported by staff at each of of these sites. The Associate Deans for the regional centers work together on computer-related issues and, when necessary, consult with Computer Services on technical problems.

Computer Systems and Facilities

Nonhuman computer resources for the college consist of systems (i.e., hardware and software) and facilities (i.e., computer labs). Systems can be described in terms of workload, computer equipment, the applications software, and the system software. Facilities can be described in terms of usage, staffing, and management for the lab. Current College of DuPage systems and facilities described in the following sections include:

- Mainframe System Resource
  - IBM 4381 System
- Minicomputers Systems Resources
  - CLSI LIBS 100 System
  - Hewlett-Packard 3000 System
  - Intergraph 751 System
- Office Automation Resources
  - Wang Office Systems
  - Staff Services Resources
  - Open Campus Resources
  - President's Administrative Area Resources
- Microcomputing Resources
  - Administrative Microcomputing Resources
  - Faculty Microcomputing Resources
- Academic Computing Lab Facilities
  - LRC Instructional Microcomputer Lab
  - Individual Use IBM PC Lab
  - IBM 4381 Mainframe Lab
  - Plato CAI Lab
  - BPI Microcomputer Labs
  - Office Careers Victor Lab
  - Office Careers Wang Lab
  - Intergraph CAD Lab
  - Unix-C Lab
  - Engineering Graphics Lab
- Academic Software Resources

Mainframe System Resource

IBM 4381 Mainframe

Major Workload: The IBM 4381 mainframe system is the major administrative computer system at the college. This system maintains all student information, including Registration, Billing and Receivables, Financial Aid, and Grades. In addition, the 4381 is the system on which all major college administrative systems reside. Examples are Human Resources, Capital Assets, and General Accounting.

Besides the preceding functions, the 4381 provides support for users in the form of mainframe word processing, electronic mail, and end user computing using Application System (AS). Instructional support is provided on the 4381 via the Multi-User System for Interactive Computing system (MUSIC).

System Hardware: This system is based on the IBM 4381 processor unit, a medium capacity unit with 16 million bytes of internal memory capable of executing 2.1 million instructions per second. A variety of devices are connected to this system via 12 communication channels contained within its internal architecture.

The main categories of devices attached include communication devices or controllers, printers, auxiliary or direct access disk storage, terminals, magnetic tape storage, and control units.

A discussion of each device category follows:

- Communication Devices - Collectively these devices are required to permit equipment such as computer terminals, personal computers and printers to communicate with the system either in a local or remote setting. The communication devices include: six IBM 3274 communi-

cation control units, each providing 32 ports for terminals or printers; one IBM 3276 controller providing eight ports; an IBM 3705 communication controller used to communicate with the Wang OIS office system and the Lanier 4000 word processing system; and an IBM 7171 protocol converter used for communication between non-IBM terminal types and the 4381 mainframe.

- Printers - These are output devices providing hard copy reports, graphs, and charts. These printers include: a Hewlett-Packard HP2689A laser printer capable of producing the equivalent of 45 to 180 printed pages per minute; an IBM 4245 band printer rated at 1800 lines per minute; 11 IBM 3287 dot matrix printers capable of draft-quality remote printing at 120 characters per second; two IBM 3812 pageprinters used for high quality text and graphics output rated at 12 pages per minute; and an IBM 6180 plotter for low speed color graphics output.

- Terminals - The college has a variety of terminal types available for use as online data entry and/or inquiry devices. These include IBM 3270 type terminals, Wang and Lanier workstations, Lear Seigler ADM terminals as well as IBM personal computers PC, PC/XT, AT, 3270 PC, and 3270 AT. The current maximum number of terminal ports available are 160 local, 62 remote ports, 32 Wang ports, and 8 Harris Lanier ports.

- Magnetic Tape Units - The 4381 system has three IBM 3420 tape drives used for archival, backup and special purposes.

- Disk Storage - Direct Access Storage devices, known as DASD, provide storage for the vast quantities of data, application, and system programs required to operate the computer system. Historically, the need for disk storage tends to increase relentlessly over time as more system and application programs are added, combined with existing data base growth. We currently have eight IBM 3370 disk drives and two IBM 3380 disk drives for a combined total of approximately 10.5 gigabytes of disk storage. (One gigabyte equals approximately one billion characters of information.)

This concludes a brief description of the physical structure and hardware of the IBM 4381 system. In order to more fully describe the system, a discussion of the current software is needed to provide a proper prospective of the power and limitations of this system.

System Software: System software consists of those operating system programs, utilities, languages, communication monitors, access methods, data base programs and other miscellaneous special software that provides a bridge between the computer hardware and the end user.

Appendix G shows the relationships present among the many individual types of software present on the 4381 system. A summary of this information would indicate that the system operates within layers of software. At the core is a powerful operating system known as VM/SP3 or Virtual Machine System Product 3. This operating system package allows the system hardware resources to be shared by multiple operating systems running in what is known as virtual machines. This environment permits maximal flexibility for the resources available as well maximizing system integrity by keeping these operating system environments in separate virtual machines so that, for example, errors in a test application do not cause problems in a production online application.

We currently have several operating systems running under VM. They are CMS, VSE/SP2.1 and MUSIC.

CMS - The Conversational Monitor System is an interactive operating system designed specifically to run under VM. It allows a user to have access to a portion of the main system's resources and communicate with other virtual machines running other operating systems. CMS currently is used in conjunction with the following system software:

- GDDM - Graphical Data Display Manager. This is a series of programs providing for sophisticated mainframe color graphics.

- SQL - Structured Query Language. This is an IBM supplied relational data base management system. A data base management system provides for the creation, organization and maintenance of data files in a manner allowing flexible updating and reporting capabilities.

- DCF/XEDIT - Document Composition Facility. In conjunction with SCRIPT a mainframe text editor, DCF, provides a sophisticated online text processing and file system useful for both word processing and online editing of documentation.

- AS - Application System is an end user productivity tool supported under CMS. Features include file creation, storage and sharing; graphics; ad-hoc reporting; and specialized functions.

There are a number of other languages and utility programs available under CMS including Assembly Language and COBOL programming language compilers. Please refer to Appendix G for a complete listing of these.

VSE/SP2.1 Virtual System Extended/System Product 2.1. This is the main production operating system in use at the college. It runs under the VM operating system on one large virtual machine. A description of the major system software operating under VSE follows:

- CICS - Customer Information Control System. CICS is an IBM supplied terminal communication monitor that coordinates, maintains, and controls the transfer of data between online terminals and the mainframe computer. Most current online production systems at the college operate under this environment.

  Two special software products that run under and in conjunction with CICS are PANVALET, an online editor used by Computer Services staff to enter, modify, and document programming code; and Omegamon-CICS, a performance monitor whose purpose is to identify problem areas in the functioning of CICS as well as provide usage and performance data for use in performance tuning.

- IDMS/R - Integrated Data Management System/Relational is a data base management system supplied by Cullinet Corporation consisting of a number of modules including application development software tools, data dictionary creation and manipulation software, reporting and query features, and general data base creation and maintenance programs. All future major system development at the college will take place in this environment.

- Easytrieve Plus is a report generator tool allowing for the rapid creation of custom reports for file structures defined within its format.

  Communication and Access Method System Software is needed to provide for the transfer, storage, integrity, and access to data either within the local computer system or between the on-campus system and remote sites. This system software includes:

- VSAM - Virtual Storage Access Method. An IBM-developed method of providing non-sequential access to files of data stored on auxiliary disk storage. The existing major applications at the college use this file access method.

- BTAM - Basic Telecommunications Access Method. This is an IBM developed software package for controlling, monitoring, and allowing remote locations to communicate with the 4381 mainframe. Areas such as Open Campus communicate with the mainframe using this method.

- 3705EP - Emulation Program is a set of software routines provided by IBM that allows non-standard devices to communicate with the mainframe through the 3705 communication controller.

- RSCS - Remote Spooling Communication Subsystem is communication software for the VM-CMS environment permitting remote communication and specialized local data manipulation between virtual machines.

  There are a number of computer language compilers/assemblers including IBM Assembly language, RPGII, COBOL, and Fortran supported under the VSE operating system as well as a number of utility programs for such tasks as sorting and copying files, maintaining job accounting information, and keeping track of printed output.

Application Software: Application Software consists of all programs written in-house or provided by vendors that produce useful output for end users. This output can be in the form of hardcopy

reports, online terminal screens or any other media needed by users. Application software also provides for the creation and maintenance of files and data bases containing student, financial or other types of information needed. Below is a brief description of the major applications currently on the IBM 4381 system.

VSE Applications

- CDAS - The College of DuPage administrative system is the largest CICS online system currently operating at the college. It consists of:

  SRS - Student Records System. This system maintains information necessary to support admissions, scheduling, registration, grades, and transcript processing. In addition, SRS provides instructors with necessary course, class, and fee information.

  The major user areas of this system are the Records Office, Registration Office, Instructional Services, Business Office and Financial Aid Office.

  The Student Record System is composed of the six separate files listed below:

File	No. of Records
Class Roster-10 Quarters	8,500,000
Course Inventory	8,200
Course Term-3 Years	50,000
Student Term-3 Years	332,500
Student Key-6 Years	225,000
Codes	2,400

  BRS - Billing and Receivable System. This system manages all student financial data as it relates to the Student Record System, Financial Aid System, and General Ledger System. It maintains the student's account through payments, schedule/bill printing, and subcodes associated with the transactions performed. The principal users of this system are the Business Office, Financial Aid Office, and Registration Office. There are currently 31,000 records stored on these systems.

  FA - Financial Aid. The Financial Aid System is responsible for tracking federal, state, and local financial aid for students and monitoring student enrollment as well as student employment. The main users of this system are the Financial Aid Office and the Business Office. The Financial Aid System has a master file containing 31,000 records.

- GLS - General Ledger System. This is currently a separate system processing purchase orders, journal entries, cash receipts, cash disbursements by vendor, and maintaining a chart of accounts. The main user of this system is the Business Office.

  The General Ledger System is composed of five main files listed below.

File	Number of Records
Purchase Orders-5 Years	195,000
Vendors	20,000
Accounts-5 Years	79,000
Journal Entry/Cash Receipt-5 Years	123,000
Invoices-5 Years	177,000

- Capital Assets System is a new system developed in-house under IDMS/R replacing the older Fixed Asset Inventory System (INVS). This system permits tracking of all inventory items owned and maintained by the college. It also contains financial location and other miscellaneous information associated with the individual items account. The main user of this system is the Business Office. The system contains approximately 23,000 records.

- Human Resources. This system is based on a software package purchased from Integral Systems consisting of an automated Personnel System and a new Payroll system. It is an IDMS/R based package. The system provides salary, time reporting, job status, job history, education, and time away from campus information. The principal users are the Human Resource Area and the Business Office. This system is scheduled for implementation, Spring of 1987. The system initially contains about 5,000 records.

- MIS-Management Information System. This reporting system provides information required for Illinois Community College Board regulations, tracks student enrollment, provides demographic information, and verifies data needed for State and Federal reimbursement procedures.

  The principal users of this system are Research and Planning Office and Instructional Services. This system currently does not maintain any permanent files but accesses, sorts and extracts information from about 30,000 records at a time.

CMS Application Software: Application software provided under the CMS operating system is currently not as comprehensive as the major administrative programs running in the VSE environment. The major applications included under CMS include:

- Program Request is a Computer Services developed system for entering, tracking, and monitoring administrative programming requests submitted by administrative areas of the institution. This application is a combined SQL data base and AS (Application System) developed reporting system typical of future small application development in Computer Services. The main users of this system are the Computer Services staff and the administrative areas submitting programming requests.

- Budget System is an SQL application developed by Computer Services personnel to manage and control the Computer Services budgeting process. Computer Services is the only user of this system.

- Menu is an application developed by Computer Services personnel providing Electronic Mail Services for CMS users. It also simplifies various file and document handling techniques provided under the VM/CMS operating systems.

- Application System is an end-user product developed by IBM. It provides several modules available to relatively non-technical computer users including reporting, file creation and updating, graphics, project management, statistics, business communication and business planning. These modules can be used relatively independently by users with a moderate amount of training. Currently applications including Project Management, Human Resource Reporting, Unit Cost Analysis, and an Aged Receivables tracking and follow up system have been implemented. The principal users of this system to date have been the Business Office and Computer Services.

MUSIC - Multiuser System for Interactive Computing: MUSIC is a multiuser interactive operating system that includes a collection of applications, compiler interfaces and utilities. Students use this system as an interface and editor for courses in COBOL, FORTRAN, PL/1, Assembler, RPGII, and SPSS programming languages. As a single virtual machine, MUSIC/SP can support the following:

- Up to 50,000 user sign-on's in full screen edit mode

- 3270 emulation and file transfer on an IBM PC microcomputer

- Electronic mail combined with a calendar system

- Output to a variety of printers

The MUSIC system is used to support 26 terminals in a lab environment supporting academic courses in COBOL, PL/I, Assembler Language, Fortran and RPGII programming languages, as well as numerous other courses including operating system, data base techniques, systems analysis and statistical analysis.

Minicomputer Systems Resources

Currently Computer Services is responsible for three minicomputer systems at the college. A minicomputer is essentially a smaller, lower capacity computer than the average mainframe computer such as the IBM 4381. Usually, but not necessarily, minicomputers are dedicated to a single specialized function. Their systems are based on independent hardware architecture and usually cannot share programming languages, operating systems or hardware resources with each other. The systems in use at the college are described in the following sections.

CLSI LIBS 100 System

Major Workload: This system supports the Learning Resource Center Library System. The system is provided by CLSI Corporation as an integrated package consisting of both software and hardware.

The system provides online check-out and check-in facilities, an on-line card catalog for patron use, as well as reporting and data entry capabilities for library management. Computer Services does not provide programming support for this system, but does provide hardware and general system management.

Hardware Resources

- Processor - The system is based on a DEC (Digital Equipment Corporation) PDP 11/34 processor containing 128 KB of main memory.
- Disk Storage - The system has three 300MB DASD drives, two fixed and one removable, for a total of 900 million characters of disk storage.
- Magnetic Tape Storage - One Kennedy model 9000 tape drive is used for backup and archival purposes.
- Terminals - Five DZ Control Units are installed providing a maximum capacity of 40 terminal ports. Currently 32 terminals are active, all located in the Learning Resource Center area. Two dial-up lines are available for remote use. The current system cannot support more than 40 terminal ports without seriously degrading system response time.

System Software: The CLSI system runs on proprietary software provided by the vendor. Contractually, Computer Services cannot currently modify this software and must rely on the vendor for any programming corrections and upgrades.

The operating system is called LIBS 100 2681 and is unique to this system.

Application Software The application programs are written in a special programming language referred to as FLIRT (File Language in Real Time). The application software consists of three modules:

- PAC - The Public Access Catalog. This module manages the online card catalog
- Circulation Control - This module is responsible for the automated check-out, check-in facilities as well as keeping track of library fines
- Acquisition Module - This module manages acquisitions of new materials

Hewlett-Packard 3000 System

Major Workload: The only major application active on this system is the Response System with variable Prescription (RSVP). This is a sophisticated method of supporting individualized instruction courses for students. Approximately 2,500 students are enrolled in these individualized study courses.

System Hardware

- Processing Unit - The system is based on the HP3000 minicomputer with two megabytes of main memory.
- Disk Storage - Two Model 72955 120 megabyte DASD units are installed on the system providing a total of 240 million characters of auxiliary disk storage.
- Magnetic Tape Units - one model 7970E HP tape drive is installed on the system for archival and backup purposes.
- Printing Capacity - The system printer is a Data Product Model 8070 printer. There are two remote printers located in the Developmental Learning Lab.
- Terminals - The system has a maximum capacity of 60 terminal ports; currently six are in use supporting the RSVP function. These are located in the Developmental Learning Lab (DLL) and the Instructional Design Area.

System Software: The operating system for the Hewlett-Packard System is called MPE. Programming languages supported include SMS COBOL II, SMS Fortran and SMS SPL (System Programming Language). No development is currently underway with these languages at the college.

Application Software: The Response System for Variable Prescription (RSVP) is the only major application software on this system. Once student course and instructor information, and the correct responses to a given test are entered into RSVP, it can be used to perform the following:

- Store and output student demographics.
- Grade test questions and send the grade with recommendations to each student. Test results are input via a SCANTRON reader.
- Generate a letter to each student showing progress in the course and provide a prescription for improvement. The option for individual letters for each student or a letter for the entire class can be chosen.
- Calculate a final grade for a course and other statistics which are sent to each student.
- Assign students to an appointment with the instructor.
- Send information to students about the course and class including start and end date, location, credit hours and assignments.

RSVP is used by the Learning Lab and Testing Center and will support an effort to improve student retention at the college. Math placement tests results are also analyzed using RSVP.

Intergraph 751 System

Major Workload: The Intergraph 751 system's major application is in the area of computer aided design and computer aided manufacturing instruction in the Occupational and Vocational Training Area of the college.

System Hardware

- Processor Unit - The system is based on a Digital Equipment Corporation DEC CAX 11/751 control processor with six megabytes of main memory.
- Disk Storage - The system has two direct access storage devices (DASD) with capacities of 337 and 160 megabytes of memory. The combined auxiliary storage of this system is 497 million characters of data.
- Magnetic Tape Unit - One magnetic tape drive is installed on the system to provide backup and archival services and to apply system software upgrades and changes.

- Terminals - The system has two Interact Color Display Stations and ten Interpro Model 32 terminals for design and instruction. These devices are located in the CAD/CAM instructional areas.
- Printers - Three Model V80 printers are installed on the system to provide hard copy design output.

System Software: The Intergraph operating system is the Virtual Memory System (VMS). The Disk Management Facility (DMS) manages the disk storage, and Word Processing MAX 11 is an online editor used to incorporate text into drawings created on the system.

Application Software: The application software is used to provide an environment for architectural, space planning, numerical control design work, and instruction. The major software includes:

- APD - Architectural Production Design
- IGDS - Numerical Control/Architectural Production Design
- NCPPS - Numerical Control Ports Programming System
- SPFM - Space Planning Facilities Management

Office Automation Resources

Wang Office Systems

The college has two WANG OIS 140 office systems in operation. These systems can communicate with each other, sharing printer resources and data storage.

In addition, both of these systems is connected to the IBM 4381 mainframe via the 3705 communications controller and WANG OIS 3274 emulation software. This feature permits each of the attached Wang terminals or personal computers to emulate an IBM 3270 type terminal to access administrative applications on a read-only basis.

Major Workload: One OIS system is used as a dedicated word processor by the Deans Offices and other academic areas in the IC Building. The other OIS system is reserved for use by Office Careers for teaching centralized word processing concepts to students in the Office Careers area.

System Resources: Both processor units are located in Room 2014 of the Instructional Center. The Office Automation OIS system used by the Dean's offices has all 32 terminal ports dedicated. These ports are connected to a variety of types of Wang dedicated word processing workstations, six Wang printers and two Wang personal computers. The Office Careers OIS system currently has 16 ports active with 13 Wang dedicated word processors, three dot matrix printers and a Wang Personal Computer.

These systems have Wang OIS word processing, file sharing, and IBM 3274 emulation available to them. In addition, the Wang Electronic Mail package has been used and is of limited usefulness currently due to a lack of available ports for new terminal connections, and the interfacing with the IBM mainframe.

Staff Services Resources

Staff Services has a newly acquired LBS 5010 network controller with 10 megabytes of storage combined with nine LBP Lanier Business Processor Workstations and five Model 1600 letter quality printers.

Staff Services uses this equipment to perform a variety of word processing tasks for the school. The equipment in this area is not currently connected to any other automated systems at the institution.

Software used is proprietary Harris-Lanier word processing.

Open Campus Resources

Open Campus has a separate office automation system consisting of a Lanier Model 5050 LBS Network Controller with 50 megabytes of disk storage, eight Lanier Business Processor LBP workstations, and five model 1600 letter-quality printers.

These workstations run Harris-Lanier proprietary word processing software. In addition this system communicates with the IBM 4381 mainframe via the 3705 communication controller and Harris-Lanier 3270 terminal emulation. This IBM connectivity allows access to the CDAS mainframe applications.

President's Administrative Area Resources

This system consists of four IBM 3270/AT personal computers with individual letter quality IBM quietwriter printers combined with an IBM 3812 Pageprinter. All of this equipment is connected to the 4381 mainframe computer.

Word Processing software used is OfficeWriter Version 5.0 and mainframe-based CMS SCRIPT. This system allows for individual word processing, CMS based electronic mail, mainframe graphics output, and access to mainframe data and applications.

Microcomputing Resources

Administrative Microcomputing Resources

The current inventory of microcomputer equipment in operation at the institution is listed in the following figure. The total number of microcomputers in use for administrative purposes is 99. Of this total, 29 are attached to the IBM 4381 mainframe and can emulate 3270 type terminals. The majority of equipment is of IBM manufacture, fully 83 of the total. The remainder consists of Harris-Lanier, Wang, and Apple equipment.

Although all of the equipment listed is supported by Information Support Services and is considered to be for predominately administrative use, note that some equipment listed under Central Campus may be used for Academic purposes as well.

These microcomputers are used for word processing, spreadsheet calculating, small specialized data base management, graphics, and communication functions. The main application is in the area of word processing, with spreadsheet processing a distant second in importance and frequency. The 29 computers with mainframe access can emulate 3270 type terminals. If they are equipped with fixed disks and appropriate communications software, they can download mainframe data for use within the microcomputer. Most of the microcomputer systems listed have printers available, many with letter quality capabilities. Aproximately 60 systems have fixed disks available for high capacity data storage. Tape backup and CD ROM storage are not in wide use, with only two systems using this technology.

Local Area Networks (LAN's) are not in wide use. One pilot network is in development in the Career Planning and Placement Area. This network utilizes the IBM token network and will consist of four workstations. We anticipate much wider use of network technology in the near future.

DEPARTMENTAL MICROCOMPUTER RESOURCES

DEPARTMENTS	*TYPES OF WORKSTATIONS**							
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*
PRESIDENTS								
Office of President					2			2
Auditor								
CENTRAL CAMPUS								
Office of Provost							4	
Automated Office Instruction							4	
Humanities & Liberal Arts	1						1	
Social & Behavioral Sciences	1							
Natural Sciences	3		1					
Occupational & Vocational Education	4	5		1				1
Business & Services	1							
Student Affairs	5	3		3				4
Learning Resource Center	1	2	2				2	
OPEN CAMPUS								
Office of Provost	1							
Academic Alternatives	3	3		1		2		2
Business & Professional Services		1						
Regional Center - South		1						1
Regional Center - East	1							1
Regional Center - North		1						1
Community Education								
ADMINISTRATIVE AFFAIRS								
Office of Vice President		1						
Campus Services		2		1				1
Auxiliary Enterprises		2						
Financial Affairs	4	1						4
Human Resources		1		2				2
Purchasing				2				2
Public Safety		1						1
PLANNING & INFORMATION								
Office of Vice President					1			
Computer Services	4			2	1		1	4
Admissions, Registration & Records								
Research & Planning		2		1				3
EXTERNAL AFFAIRS								
Office of Vice President					1			
Public Information/Media Production		6					2	
Development		1						
Campus & Community Events								
TOTAL	29	33	3	13	5	2	14	29

*A-IBM PC
B-IBM XT
C-IBM AT
D-IBM 3270 PC
E-IBM 3270AT
F-WANG PC
G-Other
H-Mainframe Attached

Figure 2. Departmental Microcomputing Resources

Faculty Microcomputing Resources

The Academic Computing process depends greatly on the involvement of faculty who wish to use computers in class instruction. Providing faculty with access to computer resource is a necessary step in promoting computer literacy at the college and providing the tools for the evaluation and development of new computer applications. Faculty access to computers is also necessary if they are to support student use of these applications. Computers may diminish the time spent in the management of the instructional process, freeing up more time for interaction with students. Lastly,

a computer network may support communication between students and faculty and allow for the exchange of information between faculty and computer support areas.

Faculty have access to microcomputers in one of five ways:

- Shared use of IBM PC or Apple microcomputers located near or in the Divisional offices
- Shared use of microcomputers found in an instructional area and used primarily for instruction
- Shared use of microcomputers found in computer labs
- Shared use of portable microcomputers loaned out through Computer Services or the Learning Resource Center
- Very few faculty have access to a microcomputer in their office suite. Most faculty are required to leave their office in order to make use of a microcomputer.

The following figure shows more specifically the distribution of computer stations that are now available for faculty use. As indicated, many of these stations are not located in or near faculty offices, and faculty have very limited access to terminals connected to the IBM 4381, Wang OIS, HP3000, Dual UNIX or Plato systems.

FACULTY ACCESS TO COMPUTER RESOURCES

DEPARTMENTS	*TYPES OF WORKSTATIONS**							
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*
BUSINESS & SERVICES								
Divisional Office	1							
Data Processing	1	1		1				
Office Careers					1			
HUMANITIES & LIBERAL ARTS								
Divisional Office	1							
Journalism			1					
Theater			2					
SOCIAL & BEHAVIORAL SCIENCES								
Divisional Office	1	1						
TECHNOLOGY								
Divisional Office	1							
Electronics		1						
Graphic Arts			2					1
Photography			3					
HEALTH & PUBLIC SERVICES								
Medical Records	2							
Radiology	1							
Respiratory Therapy	1							
Nursing	2							
NATURAL SCIENCE								
Divisional Office	1	1						
Physical Education	1							
Biology		1						
Math			4					
ACADEMIC ALTERNATIVES								
Alpha	1							
Learning Lab						2		
COMPUTER SERVICES								
Faculty Training	3							
IC2001	2							
BUSINESS & PROFESSIONAL INSTITUTE		1						
LEARNING RESOURCE CENTER	2	1	1					2
INSTRUCTIONAL DESIGN						1	1	
REGIONAL CENTERS	2							
DIVISIONAL OFFICES					5			
TOTAL	23	7	13	1	6	3	1	3

*A-IBM PC
B-Apple II
C-TRS 80
D-IBM 4381
E-WANG OIS
F-Plato
G-HP 3000
H-Macintosh

Figure 3. Faculty Computer Resources

Academic Computing Lab Facilities

Academic Computing hardware resources include all of those systems which are used by students as a part of the instructional process, or by faculty as an aid to the management of instruction. Because of the wide variety of computer hardware at the college, computer stations have been categorized into four major types:

- Microcomputers, which include IBM PC/AT/XT, Apple II, TRS80, Amiga, Macintosh, and Zenith/Fox microcomputers.
- Minicomputers, which include Intergraph, Wang OIS, Dual-Unix, and HP3000.

- Mainframe system, the IBM 4381.
- Dial-Out systems, which include Plato and CLSI.
- Dedicated systems, which support specialized applications.

Each of these five types of resources can be further divided into those used by faculty or students in a centralized lab facility or those that are distributed individually throughout the college. Centralized computer resources consist of microcomputer, minicomputer, mainframe or Plato stations found in one of the eleven computer labs at the college. These resources may be used by all areas of the college. Decentralized resources consist of those computer systems located within instructional areas for their individual use. The following figure shows the distribution of decentralized and centralized computer resources.

DISTRIBUTION OF ACADEMIC COMPUTER STATIONS

	Decentralized	*Centralized*	*Total*
Microcomputers	70	157	227
Minicomputers	4	22	26
Mainframe	6	27	33
Plato Terminals	4	12	16
Total	84	218	302

Figure 4. Distribution of Centralized and Decentralized Stations

The following figure shows the distribution of computer stations for each type of hardware.

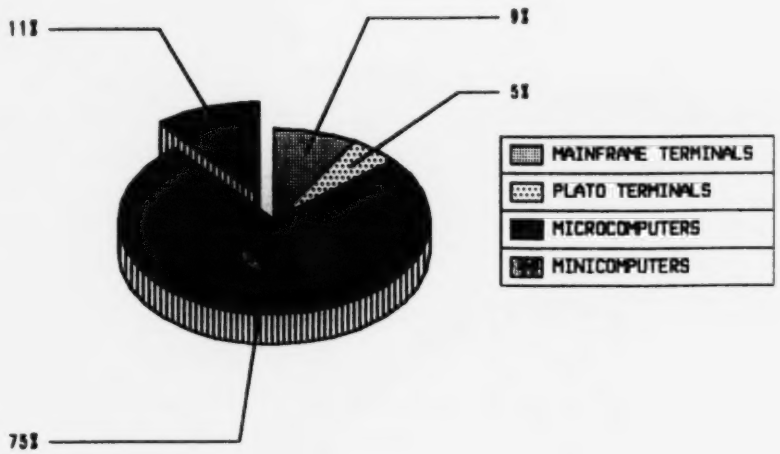

Figure 5. Distribution of Computer Stations for each Type of Hardware

The following is a list of computer labs that exist on campus:

- LRC Instructional Microcomputer Lab (SRC 3051)
- Individual use IBM PC Lab (IC 2001)
- IBM 4381 Mainframe Lab (SRC 2003)
- Plato CAI Lab (SRC 3023)
- BPI Microcomputer Labs (K 104, K 106)
- Office Careers Victor Lab (IC 3T)
- Office Careers Wang Lab (IC 3S)
- Intergraph CAD Lab (IC 1033)
- Dual Unix-C Lab (IC 1113)
- Engineering Graphics Lab (IC 1017)

Currently, these lab facilities are located in the Instructional Center, the Student Resource Center, and the Open Campus Center.

LRC Instructional Microcomputer Lab

The following sections describe each of these centralized computer facilities at the college.

Hardware: 31 IBM PC's, 10 Apple IIe's

Description: The Instructional Micro Lab supports all areas of instruction both as a teaching or learning aid and for class demonstration of computer applications. The Instructional Micro Lab is divided into two sections. The first section contains 25 IBM PC's and is used by students during regular classroom instruction. The second section contains 6 IBM PC and 10 Apple IIe micro-

computers which are used to support individual student assignments outside of class. The Instructional Micro Classroom supports courses offered in the areas of Accounting, Biology, Data Processing, Earth Science, English, Education, Mathematics, Nursing, Nutrition, Office Careers, Physics, Sociology, Political Science and Travel/Tourism. The Instructional Micro Lab is used by both Central and Open Campus and also supports faculty and staff development training activities. This lab is also a point of distribution for microcomputers and/or a portable protection system on loan to instructors.

Management: The LRC Instructional Microcomputer Lab is managed through the Learning Resource Center.

Staffing: The LRC Instructional Micro Lab is managed by a full-time lab supervisor who also manages the Media Delivery Center. One student lab aide is stationed in the lab at all times the lab is open. (76 hrs/wk)

Individual Use IBM PC Lab

Hardware: 40 IBM PC's

Description: The Individual Use IBM PC Lab supports all microcomputer-based Data Processing courses as well as courses in Accounting, Sociology, Office Careers, Marketing, Engineering, Hotel/Motel Management and Food Services Administration. This lab is available to all areas of instruction and is used to support only individual student use of computers. This lab is open seven days a week and may be used at any of those times that are convenient to the students' work schedule. Student assignments are tied to instructional applications which are distributed to students in the lab. Support materials and individual help are also provided. This lab is also a point of distribution for two portable IBM PC's on loan to instructors for use in their office or during classroom instruction.

Management: The Individual Use IBM PC lab is managed by Computer Services.

Staffing: The Individual Use IBM PC Lab is managed by a full-time lab supervisor who also manages both the IBM 4381 and Unix labs. Two student lab aides are stations in the lab at all times the lab is open (70 hrs/wk)

IBM 4381 Mainframe Lab

Hardware

23 3278 IBM terminals

3 LA120 terminals

1 IBM 3287 printer

Description: The IBM 4381 Mainframe Lab contains 26 terminals which are connected to the IBM 4381 or the HP3000 mainframe computers. On the average, seventy-six percent of students using the lab were enrolled in one of the following Data Processing courses: COBOL Programming Language, COBOL Programming Applications, FORTRAN Language, PL/1 Programming Language, PL/1 Applications, Assembler Language, Assembler Applications, Data Communications, SPSS Programming, Business or Scientific Programming Applications, Operating Systems, System Analysis, RPG Programming, or Data Base Management. Usage of the IBM 4381/HP3000 lab by students outside of the Data Processing area has decreased over the last five quarters with a shift to microcomputer usage. During the Winter-86 quarter, only two non-Data Processing courses - MANUF 198 (Independent Study) and ELEC 142 (Intro to Digital components) made use of the lab. Student usage of the HP3000 has shifted to the IBM 4381. The IBM 4381 Mainframe Lab is available seven days a week and supports individual, unscheduled use of computers. The lab does not support classroom instruction.

Management: The IBM 4381 Mainframe lab is managed by Computer Services.

Staffing: The lab is managed by a full-time supervisor who is also responsible for the Individual IBM PC Lab and the Unix-C Lab. One student aide is stationed in the lab at all times that the lab is open (70 hrs/wk).

Plato CAI Lab

Hardware: 16 Plato terminals, 2 Multiplexers

Description: Students make use of the Plato system through ten terminals located in a small lab facility in the Learning Resource Center (SRC 3023), two terminals located in the Learning Lab, two terminals in the Nursing area and one terminal in the ESL area. Faculty have access to these terminals including one additional terminal located in the Instructional Design area. The Plato lab is used by students on an individual basis but is also available for classroom instruction.

The power in the Plato system, as an instructional aid, lies in the extensive software collection which is considered to be "State of the Art" in computer assisted instruction. Plato offers computer-based support materials in all areas of instruction and most of these materials have been developed and improved upon over the last ten years by instructors at the University of Illinois. In a sense Plato represents tried and tested computerized instruction which is ready to use at the cost of the hardware connection. A survey conducted by Computer Services during Spring '85 quarter found that most faculty placed Plato usage as a top priority and equal in importance to microcomputer assisted instruction or word processing.

Areas of instruction which use the Plato system include: Accounting, Anthropology, Biology, Data Processing, Chemistry, English, Electronics, Economics, Mathematics, English as a Second Language, Nursing, Travel/Tourism, Religious Studies, Sociology, Music, First Aid, Foreign Languages, Government, Physics, Automotive Technology, Psychology, and Radiology and the Alpha program. The Plato system also contains an authoring system that may be used by Instructional Design and/or faculty to develop new applications.

Before and now especially after the installation of additional terminals, the use of Plato has been promoted. This has resulted in an increase in use of the system and an increase in the number of faculty that are now evaluating Plato software for their instructional area. These activities are supported by Instructional Design which is also responsible for contractual agreements, equipment purchase, installation and repair of terminals, the distribution of materials which describe Plato software holdings, management of student accounts, faculty training in the use of the Plato system and student support in the use of Plato programs.

Management: The Plato system is managed by the Instructional Design area.

Staffing: The Plato system is managed by a full-time faculty member in the Instructional Design area. The Plato Lab is available 76 Hrs/wk. Student use of Plato is currently not supported by a lab aide stationed in the Plato Lab.

BPI Microcomputer Labs

Hardware: 18 IBM PC's

Description: Two BPI Microcomputer Labs support Continuing Education courses offered in the evening (6:30-9:00) and on Saturdays (9:00-4:00) as well as courses offered by the Regional Assistance Center for dislocated workers (9:00-5:00, Mon-Fri). The lab supports scheduled classroom instruction and not unscheduled use by individuals.

Introductory and advance courses are offered through Continuing Education on business and programming applications which include wordprocessing (Wordperfect, Multimate, Wordstar 2000); Basic programming, Data Base (DBase III), Integrated software (Lotus 1-2-3), Spreadsheets (Visi-

calc), networking, mainframe interface, CAD/CAM and Computer for Banking and Manufacturing. These courses are open to the business public as well as individuals from the community.

Other courses offered through the Regional Assistance Center are designed to provide basic computer skills to dislocated workers.

Management: BPI Microcomputer Labs are managed by the Business and Professional Institute

Staffing: Each BPI Microcomputer Lab is staffed by one lab aide during class sessions and student use is also supported by their instructor. BPI Labs are open 60 Hrs/wk.

Office Careers Victor Lab

Hardware: 17 Victor 9000 Microcomputers, 4 IBM PC's

Description: The Victor Microcomputer Lab is used primarily by students in the Office Careers area although over the past year it has been used by the Data Processing, Psychology and Job Training Center. Courses utilizing the lab include Introduction to Microcomputers (OFFC-115), Data Entry (OFFC-118), Word Processing Concepts (OFFC-120), Advanced Wordprocessing on Microcomputers (OFFC-128), Word Processing for Microcomputers (OFFC-127), Micro-application (Data-250), Job Skills-Wordprocessing (JOBS-359) and General Psychology (PSYCH-100). The Victor Lab supports both individual use of computers and classroom instruction.

Management: The Office Career Victor Lab is managed by the Office Careers area.

Staffing: The Victor Lab is managed by one full-time lab supervisor who is also responsible for the Wang Lab. One student lab aide is stationed in the lab at all times that the labs open (74.5 Hrs/wk).

Office Careers Wang Lab

Hardware: 8 Wang terminals

Description: The Wang OIS Lab supports students enrolled in Word Processing (OFFC-125) and Advanced Word Processing (OFFC-126) courses and is used primarily by the Office Careers area. The Wang Lab supports classroom instruction and some individual use of computers.

Staffing: The Wang Lab is managed by a full-time supervisor who is responsible for the Victor Lab. One student lab aide is stationed in the lab at all times that the lab is open (74.5 hrs/wk).

Integraph CAD Lab

Hardware: 10 Interpro Microcomputer Stations, 2 Interact Design Workstations

Description: For Fall '85 quarter the Intergraph CAD Lab supported five sections of the CAD 110 (Introduction to Computer-Aided Design) and faculty training activities in the area of Technology. Use of the Integraph CAD System has increased and will eventually be used by the Architecture, Engineering, and Electronics areas of instruction. Other areas which may use the CAD system in the future include Interior Design, Fashion Design and Art Instruction.

Management: The Intergraph System is supported by Computer Service. The CAD Lab is managed by the Technology area.

Unix-C Lab

Hardware: 6 stations (1 Intel 431 DEV Systems)

Description: Two Intel 431 Development minicomputer systems provide six student workstations and access to the Unix Operating system, the C Programming Language, a Macroassembler, Editor, Data Base System and Graphics Software. The Unix-C lab supports students in the Software Technology, Data Processing and Open Campus-Continuing Education area of Instruction. Courses include Introduction to Unix (MICR 012, Data 270), The C-Language (MICR 013) and Software Tools I and II (ENGI 130, 231, 232). The Unix-C Lab supports individual use of computers and classroom instruction. Use of the Unix-C lab is expected to grow after the Intel 4381 minicomputer systems are replaced by two AT&T 3B5 systems.

Management: The Unix Lab is managed by Computer Services.

Staffing: The Unix-C lab is managed by a full-time supervisor who is also responsible for the Individual Use IBM PC Lab and the IBM 4381 Mainframe Lab. One student lab aide is stationed in the lab at all times that the lab is open (20 hrs/wk).

Engineering Graphics Lab

Hardware: 2 Tektronix 4014 terminals

Description: The Engineering Graphics Lab contains two Tektronix 4014 terminals, one Tektronix 4631 hard copy unit and one Calcomp plotter. These terminals provide access to the IDF Graphics program on the IBM 4381. The Engineering Computer Lab supports students enrolled in ENGI 102 (Engineering Graphics) and ENGI 198 (Independent Study) in the Engineering and Manufacturing areas of instruction. The Engineering lab is used by students to complete extra credit assignments outside of class and for class instruction of students taking ENGI 120.

Management: The Engineering Graphics Lab is managed by the Engineering Area of Natural Sciences.

Staffing: Support in the use of the lab is provided to students by their instructor and one part-time lab aide. The IDF software is maintained by Computer Services.

The following figure shows the percent of students enrolled in classes which use each lab facility. These numbers were obtained as an average for the Fall-84, Winter-85, Spring-85 and Fall-85 quarters. These numbers are based on student enrollment figures and do not address the frequency or amount of time students use each lab facility.

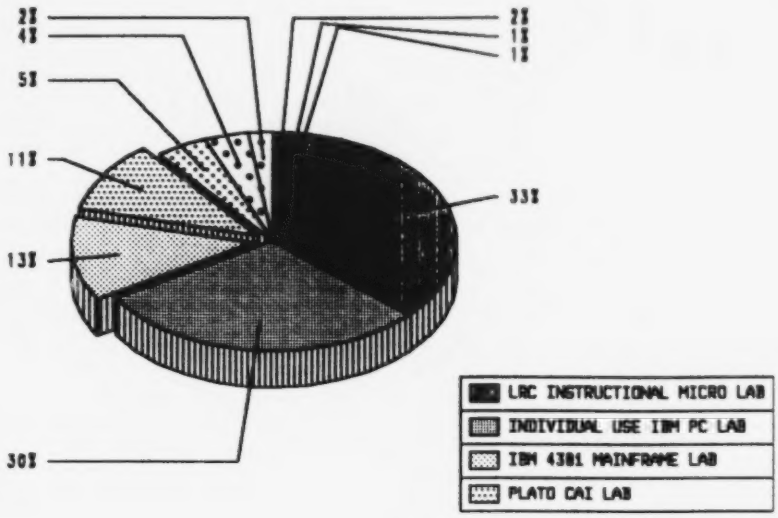

Figure 6. Student Use of Computer Labs

New Microprocessing Center

Plans are now under way to construct a microprocessing computing center which will incorporate many of the lab facilities into one area. This facility will serve as a site for centralized support and distribution of computer materials. This facility is proposed to provide multiple computer equipped instructional areas for both classroom and individual use of computers. The microprocessor computing center will contain a Computer Aided Drafting/Design (CADD) lab facility, a student work area, a faculty research/development/ training area, offices, and an area for Plato, IBM 4381 and UNIX-based instructions. Some of the benefits derived from the consolidation of computer resources into the microprocessor computer center includes:

- The facility will be in close proximity to existing high technology programs and therefore better serve the high technology needs of the industries located in the DuPage corridor.
- The facility will provide better access to computer resources and more efficient scheduling of class usage.
- The facility will provide one location where students from all instructional areas can obtain support, information and software.
- Centralized hardware and software make possible the sharing of equipment and programs, which in turn lowers the cost of materials and provides easier management of computer usage. This results in the need for fewer support staff.
- The facility will provide a centralized area for faculty research and development which does not currently exist at the college.
- The eventual networking of computers is more easily accomplished in a centralized lab facility.
- The microprocessor computer facility will allow for additional growth in the use of computers (as projected) for the next three years.

June 3rd, 1987

Academic Software Resources

Academic software resources at the college can be divided into four groups:

- The first group consists of microcomputer software stored in a computer lab facility which is used primarily by students. This includes software located in the individual use IBM PC lab, LRC Instructional Microcomputer Lab, Office Careers Victor Lab and the BPI Microcomputer Lab. Twenty-five percent of all microcomputer software titles at the college fall in this group.
- The second group consists of microcomputer software which is decentralized and located in non-lab areas. Many of these programs are used by faculty and access is limited to one or only a few individuals. They may be used for class demonstration but in general students have very little hands-on access. Seventy-five percent of all microcomputer software titles at the college fall in this group.
- The third group consists of Plato software stored at the University of Illinois and available online to faculty and students who use the Plato system.
- The fourth group consists of software available online through one of the mainframe or minicomputers systems located at the college. These systems include the IBM 4381, HP3000, Wang OIS, Dual-Unix, and Intergraph-CAD systems.

Six percent of all software falls into this group. Educational software at the college belongs to the following categories:

Computer Assisted Instruction (i.e., Plato, Clear)

Computer Managed Instruction (i.e., RSVP, Merimac)

Computer Emulation Programs (i.e., Sabre, Restaurant Management Simulation)

Statistical Programs (i.e., SPSS, Minitab, Microstat)

Mainframe Languages (i.e., COBOL, Assembler)

Operating Systems and Editors (i.e., VSE, Music, Unix)

Microcomputer Languages (i.e., C Language, Turbo Pascal)

Fourth Generation Language (i.e., Application System)

Communications Utilities (i.e., Crosstalk)

Authoring Systems (i.e., Tutor, McGraw-Hill Authoring System)

General Purpose Programs (i.e., Word Processing, Spreadsheet, Data Base)

Integrated Software (i.e., Framework, Symphony, Lotus 1-2-3)

Microcomputer Graphics (i.e., PFS Graph, Chartmaster)

Computer Aided Design (i.e., Intergraph CAD, IDF Graphics)

Computer Aided Manufacturing (i.e., XL/NC)

Artificial Intelligence (i.e., LISP, Micro Prologue)

Online Data Bases (i.e., DIALOG, LRC Periodical System, CLSI)

An inventory of computer software is now available to faculty which identifies software title, hardware compatibility and where software is located at the college.

June 3rd, 1987

ACADEMIC COMPUTING

Overview

Academic Computing includes all of those activities which are integral to or related to student instruction in computer-related disciplines, or other instruction which relies on computers. This includes all computing functions which either assist instructors in the development or maintenance of course materials or facilitate students in the learning process. Academic Computing involves all of those activities which support the use of computers such as the maintenance of hardware, the integration of software into instructions, the preparation of support materials, personal consulting or problem solving and the management of lab facilities. Academic Computing also involves those activities which promote growth in the use of computers such as the consideration, selection, and review of hardware and software; training for computer literacy; computer planning and the development of new applications.

There are a number of specific issues which must be addressed in order to ensure that the use of computers will continue to grow and that computers will have a positive impact on students at the college. These areas of concern are divided into three categories: hardware, software, and support.

Hardware issues include:

- That faculty have sufficient access to computer equipment.
- That student use of lab facilities or systems does not exceed present resources.
- That purchased hardware is reviewed and meets criteria concerning cost effectiveness, compatibility, feasibility and justification for purchase.
- That computer hardware is maintained.
- That present equipment is upgraded to keep pace with new technology.
- That new technologies are investigated and used.
- That student computer facilities be centralized in order to streamline their management and improve the support provided.

Software issues include:

- That faculty and students have sufficient access to computer software. This involves:
  - providing mini and mainframe system availability.
  - identifying and establishing microcomputer software libraries.
  - improving on distribution of microcomputer software through hard disk or LAN technologies.
- That the purchase of software is reviewed and meets criteria concerning cost-effectiveness compatibility, feasibility and justification for purchase.
- That software is maintained.

- That all computer users have a clear understanding of the college's position on the software copyright law.
- That the distribution of monies for computer software address the needs of all faculty who are interested in using computers and support the direction for computing as defined by the Academic Computing Plan.

Support concerns include:

- That faculty receive sufficient support in using computers. This involves identifying areas of needed support and monitoring the level of support provided.
- That students receive sufficient support in using computers.
- That staff support personnel keep pace with the growth in the use of computers.
- That faculty receive support in the identification and development of new applications. That faculty receive support in the integration of these applications into the instructional process. Areas responsible for these last two support activities should be monitored for their effectiveness because they are so integral to the Academic Computing Process.
- That students are provided with instructions for each computer application that is made available to them. These instructions should describe what is expected of the student when using the computer.
- That faculty are provided with information on new applications or the options they have in selecting a computer system for their students to use.
- That faculty are provided with incentive to become computer literate.
- That faculty are provided with incentive to research and develop new computer applications.
- That faculty are provided with incentive to effectively integrate the use of computers into instruction.

The Academic Computing Departmental Survey has provided information which allows for a projection of computing needs over the next three years and also how hardware and software resources should grow to support those needs. This section provides a brief description of the major instructional divisions for Central and Open Campus, and the level of computer usage for these areas as identified in the survey.

Growth projections for Central and Open Campus are presented in terms of the number of additional students and contact hours, as well as a written description of those areas where growth is expected to occur. This includes a description of new applications or systems that may be used over the next three years. Projections in the number of additional computer stations were also determined for the college as a whole for each type of computer resource.

Faculty access to computer resources has also been evaluated and compared to the number of computers which are needed over the next three years. The Academic Computing Departmental Survey has also provided information on the current amount of money budgeted for software by each area of the college and the projected percentage increase which is needed over the next three years. The Academic Computing Survey provided a description of the applications which are needed.

Student computer support was also evaluated by determining the current level of support in terms of FTE support staff per number of computer users and then projecting how support should increase over the next three years to maintain the current level of support. The current level of faculty computer support was also determined and the importance of various types of support was evaluated. A comparison will also be made between the number of support staff available to students and faculty at the College of DuPage and the other community colleges which were surveyed.

Below is a description of each area of instruction for Central and Open Campus followed by a description of current computer usage, a description of projected usage, and a summary of the new applications or systems that may be used over the next three years.

Student Usage

Central Campus

A description of each of the five divisions of Central Campus is included here along with a summary of instructional areas that use computers; the computer facilities or systems which are used; projections or usage for the next three years; and new applications or systems that may be investigated. Again, these projections represent the number of additional students who will use computers for FY 1988, FY 1989, and FY 1990. Increased usage is also expressed as a percent increase over FY 1987 usage. Where there was no computer usage in FY 1987, projected increases are expressed as an estimate of the number of additional student users.

Business and Services

Description: The Business and Services Division prepares students for entry into the job market or for continuing their education at a four year college. Courses provide real world experience through a curriculum tied to the skills needed by business and industry. Business Management programs range from office careers, accounting and data processing to marketing/retailing and real estate. Applied arts include interior design, fashion design, advertising design and illustration. Other courses develop the skills necessary to meet requirements of the travel/tourism, transportation/ physical distribution, criminal justice and library technology professions. Other courses train students for positions in food services, hotel/motel management, ornamental horticulture or supermarket management.

The Business and Services Division accounts for 52 percent of students enrolled in classes which use computers on Central Campus. Currently eight of fifteen instructional areas now use computers and these are areas of heavy use. These include data processing, accounting, office careers, as well as the travel/tourism, software technology, food services, hotel/motel management, commercial art, and library technology.

Students in these instructional areas make use of the Mainframe computer lab (SRC 2003A), the Individual use - IBM PC Lab (IC 2001), the Instructional microcomputer lab (SRC 3021) and the Plato system. Hardware which is dedicated and specialized to the library technology program includes CLSI terminals which dial-out to the DuPage Library system.

Projected Usage: Computer usage over the last year has increased by 25 percent for the Business and Services Division. This trend is expected to continue and usage is expected to increase over the next three years. An increase of 68% over current FY 1987 usage was projected by 1990 which will result in approximately 2,000 additional students enrolled in courses which use computers (refer to the following figure). This increase is attributed to these areas of growth:

- Expansion of data processing instruction which is micro-based and includes the latest integrated software.
- Expansion of Unix-based instruction.
- The establishment of a travel/tourism computer area which will support instruction in using airline reservation systems and other applications.
- The establishment and use of graphic design software and graphic tools for the commercial art area.
- The use of micro-based and intergraph based software by the fashion design and interior design areas of instruction.
- An expansion of use of the Wang system to include integrated office activities.
- New use of computers by the real estate program.

The following figure shows the percent increase that is anticipated over the next three years for each area of instruction and lists those areas where there is no anticipated or current usage of computers.

BUSINESS AND SERVICES

AREA	*FY1987*	*PROJECTED STUDENT INCREASE* *FY1988*	*FY1989*	*FY1990*	*TOTAL INCREASE 1988-90*
Travel and Tourism	138	200	200	200	435%
Data Processing (Micro)	1453	141	141	141	29%
Data Processing (Mainframe)	410	-22	-22	-22	-16%
Commercial Art	30	100	100	100	1000%
Fashion Design	0	0	100	100	200 Students
Accounting	473	39	39	39	25%
Real Estate	0	33	33	33	100 Students
Interior Design	0	33	33	33	100 Students
Office Careers (Micro)	180	18	18	18	30%
Office Careers (Wang)	100	33	33	33	100%
Food Service/Hotel Motel	15	0	0	5	33%
Library Technology	35	5	5	5	43%
Software Technology	30	0	0	0	0%
Total No. of Students	2864	580	680	685	Net 68%

NO USAGE AND NO INCREASE:

Criminal Justice, Business/Marketing/Management, Ornamental Horticulture, Financial Management

Figure 7. Projected Use for Business and Services

New Applications/Systems for Business and Services: Below is a brief description of the academic applications or systems that may be investigated and/or used over the next three years.

INSTRUCTIONAL AREA	*APPLICATION/SYSTEM*
Data Processing	Unix-based systems/networking
	C Language
	Micro to mainframe file transfer
Accounting	Business graphics
Business/Marketing/Management	Business graphics
Travel/Tourism	IBM PC-based reservation system and other CAI programs
Commercial Art	Lumina graphics
	Desktop Publishing
Fashion Design/Merchandising	Intergraph software
Interior Design	Intergraph software
Office Careers	Electronic Mail
	Integrated Office system/Wang
Library Technology	Dial-out to online data bases

Figure 8. New Applications or Systems for Business and Services

Humanities and Liberal Arts

Description: The Humanities Division offers courses designed to:

- Develop the student's skills in study, analysis, and evaluation
- Provide the student the opportunity to develop original ideas and to create works of art

- Develop the student's understanding of written and oral communication through the more effective use of language
- Develop the student's awareness of the nature of humanity - its social issues and spiritual aspirations
- Develop the student's insight into various cultures through the study of literature, history and languages
- Develop through study and participation the student's insight and abilities in the visual and performing arts

The subject areas of the Humanities Division are located in two subdivisions: Communications and Humanities. Communications includes English composition, journalism, and speech; Humanities includes art, English literature, history, humanities, languages, music, philosophy, religious studies, and theater arts.

The Humanities and Liberal Arts Division accounts for 15 percent of students enrolled in classes which use computers on Central Campus. As of August, 1986 seven of 29 full-time faculty surveyed[1] used computers for class-size instruction. The majority of usage involves instruction tied to word processing software and the use of HBJ writer by English faculty. Plato is also used in music theory instruction. English instructional use relys heavily on the Instructional microcomputer lab (SRC 3021) and the Plato lab, both located in the LRC. Computer use is tied directly to classroom instruction in the Humanities area.

Projected Usage: Computer usage over the last year has increased by 15 percent for the Humanities Division. Evidence that this trend is expected to continue and that usage will increase was obtained from two sources. The first source is a survey conducted by Humanities Division during Winter and Spring - 86 quarter. It reported these findings:

- Twenty of twenty-nine faculty indicated current or projected computer use directly in teaching.
- Twelve faculty identified a potential class-size instructional application.
- Workshops sponsored by the Humanities Division during 85-86 have encouraged the use of word processing and HBJ writer by faculty from all areas of the college.

The results of the Academic Computing Departmental Survey indicate a 172 percent increase in student use over current FY 1987 for the Humanities area (refer to the following figure). This will result in approximately 1460 additional students enrolled in courses which will use computers. This increase is attributed to a doubling in usage by the English area., a 50 percent increase by the music area and new usage in the foreign language (200 students), journalism (30 students) and history (30 students) areas of instruction. These projections are for FY 1990. The following figure also lists these areas where there is no anticipated or current student usage of computers. The Humanities and Liberal Arts Division has projected the highest increase over all other areas of Central Campus.

[1] Refer to the computer usage plan submitted by the Humanities Division.

HUMANITIES AND LIBERAL ARTS

AREA	*FY1987*	*PROJECTED STUDENT INCREASE* *FY1988*	*FY1989*	*FY1990*	*TOTAL INCREASE 1988-90*
English	750	250	250	250	100%
Art	0	100	100	200	400 Students
Foreign Language	0	50	50	100	200 Students
Music	100	15	15	20	50%
Journalism	0	10	10	10	30 Students
History	0	0	0	30	30 Students
Total No. of Students	850	425	425	610	Net 172%

NO USAGE AND NO INCREASE:

Speech, Theater, Philosophy

Figure 9. Projected Use for Humanities and Liberal Arts

New Applications/System for Humanities and Liberal Arts: The following is a brief description of the academic applications or systems that may be investigated and/or used over the next three years.

INSTRUCTIONAL AREA	*APPLICATION/SYSTEM*
English	Application System Writing Instruction (HBJ Writer)
	Authoring Language
	Word Processing in English Composition
	Dr. Halo
	Integraph Usage
Music Appreciation	Textbook software supplements - CAI
Foreign Languages	Textbook software supplements - CAI
Journalism	Desktop Publishing

Figure 10. New Applications or Systems for Humanities and Liberal Arts

Social and Behavioral Sciences

Description: The Social and Behavioral Sciences Division seeks to cultivate in students a broad perspective of man's behavior, cultural heritage, relationship with others, social institutions and the environment. Nine subject areas are included: anthropology, business law, economics, education, geography, political science, psychology, social science and sociology.

For those who have not yet decided on a career, the various disciplines allow exploration of several fields of study. For those interested in personal growth, the Social and Behavioral Sciences Division provides exposure to concepts that have immediate applications to everyday life.

In addition to imparting proficiency in academic disciplines, this division seeks to challenge the learner to critically examine values, ideologies, social structures, political arrangements and accepted assumptions.

The Social and Behavioral Sciences Division accounts for ten percent of students enrolled in classes which use computers on Central Campus. Currently four of eight instructional areas now use computers and one area of instruction, sociology, contributes to 55 percent of the total usage. Other areas of usage includes psychology, anthropology and education.

Students in these instructional areas make use of the Individual use - IBM PC Lab (IC 2001), the Instructional Microcomputer Lab (SRC 3021) and the Plato system. Instructional software is also used on the Apple II and Macintosh microcomputers. Faculty in the Social and Behavioral Sciences Division are now using computers as an aid to the management of instruction, for grading, word processing and the evaluation of student study patterns. They are also investigating the use of authoring languages for the development of instructional software.

Projected Usage: Computer usage over the last year has increased by 20 percent for the Social and Behavioral Sciences Division. An increase of 49% over current Fall-86 usage was projected by 1990 which will result in approximately 275 additional students enrolled in courses which use computers (see Figure 11). Usage is expected to increase with the establishment of a psychology computer area within the Division. The political science and economics areas of instruction are also projected to start using computers by 1990.

SOCIAL AND BEHAVIORAL SCIENCES

AREA	*FY1987*	*PROJECTED STUDENT INCREASE* *FY1988*	*FY1989*	*FY1990*	*TOTAL INCREASE 1988-90*
Sociology	315	20	20	20	19%
Psychology	80	20	20	20	75%
Anthropology	60	20	20	20	100%
Education	120	20	20	20	50%
Political Science	0	0	0	35	35 Students
Total No. of Students	575	80	80	115	Net 49%

NO USAGE AND NO INCREASE:

Business Law, Economics, Geography

Figure 11. Projected Use for Social and Behavioral Sciences

New Applications/Systems For Social and Behavioral Sciences: Below is a brief description of the academic applications or systems that may be investigated and/or used over the next three years.

INSTRUCTIONAL AREA	*APPLICATIONS/SYSTEM*
Geography	McGraw-Hill interactive authoring system
Psychology	Experiment simulation and data analysis
All Areas	Management of instruction and research via a micro-based test scoring and data entry system (Scantron) tied to spreadsheet and data base software (DBase, Lotus 1-2-3)
All Areas	
Micro-based statistics as part of research methods course	

Figure 12. New Applications or Systems for Social and Behavioral Sciences

Occupational and Vocational Education

Description: The Occupational and Vocational Education Division prepares students for employment in the health and technical fields by tailoring curricula to address the diverse occupational needs of the college district.

June 3rd, 1987

In pursuing its commitment to meet the needs of the community it serves, College of DuPage is dedicated to providing high quality occupational programs for students working toward professional, semi-professional, technical and skilled jobs, with curricula that reflect the quick-moving technological demands of our society.

Students can expect to meet instructors who are experts in their fields. Occupational faculty members usually have three or more years work experience backed by professional degrees. They stay abreast of the state-of-the-art and are alert to changes in techniques, job requirements, and the labor market. The following figures list the areas of instruction for the Technology and Health and Public Services areas.

The Occupational and Vocational Education Division accounts for 13 percent of students enrolled in classes which use computers on Central Campus. Currently five of nine instructional areas use computers in Health and Public Services and five of thirteen areas in Technology (refer to the following figures). These include nursing, medical records technology, radiographic technology, respiratory therapy and child care and development for Health and Public Services. These include computer aided design, graphics arts, manufacturing technology, electronics, and photography for the Technology area.

Students using computers in the Health and Public Services area make use of IBM PC's located within the Division as well as the Instructional Microcomputer Lab (SRC 3021) and the Plato system.

Students using computers in the Technology area make use of hardware which is dedicated to highly specialized applications, many of which are located within the Division. These include the Intergraph CAD system, the Amiga system for photography, the IBM PC-based Numerical Control system, the Zenith/Fox microcomputers for Digital microprocessing and the use of Macintosh microcomputers by Graphic Arts. Students in the Technology area also use computer lab resources.

Projected Usage: Computer usage over the last year has increased by 97 percent for the Occupational and Vocational Education Division. This trend is expected to continue as indicated by the projected increase in number of students using computers for each subdivision (refer to Figure 13 on page 41). An increase of 115 percent over FY 1987 usage was projected by FY 1990 for the Health and Public Services area. This will result in approximately 400 additional students enrolled in courses which use computers. An increase of 180 percent over current FY 1987 usage was projected for the Technology area. This will result in approximately 600 additional students enrolled in courses which use computers. This increase is attributed to:

- A two- or three-fold increase in usage of IBM PC and Plato by the nursing, medical records, radiographic and respiratory therapy areas of instruction.
- Expansion of the CAD program
- New course offerings in the areas of telecommunications and digital and microprocessor technology
- 20 - 25 percent increase in usage each year for the photography, graphic arts and automotive areas
- Increase in use/expansion of the XL/NC numerical control system
- New usage in Fire Science and Architecture .

The following figure also lists those areas where there is no anticipated or current usage of computers.

OCCUPATIONAL AND VOCATIONAL EDUCATION

AREA	*FY1987*	*PROJECTED STUDENT INCREASE* *FY1988*	*FY1989*	*FY1990*	*TOTAL INCREASE 1988-90*
HEALTH AND PUBLIC SERVICES					
Nursing (ADN, LPN)	118	40	40	40	100%
Medical Record Technology	73	49	47	45	193%
Radiographic Technology	73	24	24	24	100%
Respiratory Therapy	66	22	22	22	100%
Child Care and Development	16	0	0	0	0%
Total No. of Students	346	135	133	131	Net 115%
TECHNOLOGY					
Digital Microprocessor Tech	0	67	67	67	201 Students
Manufacturing Technology	80	16	16	16	60%
Photography	24	25	25	25	313%
CAD	120	28	28	30	72%
Fire Science	0	0	30	0	30 Students
Architecture	0	0	0	30	30 Students
Commercial Arts and Sciences	0	0	25	0	25 Students
Graphics Arts	100	20	20	20	60%
Automotive Technology	0	25	25	25	75 Students
Electronics	25	0	0	0	0%
Total No. of Students	349	181	236	213	Net 180%
Total No. of Students	695	316	369	344	148%

NO USAGE AND NO INCREASE

Health and Public Services: Recreational Leadership, Nuclear Medicine, Long Care Administration, Human Services

Technology: Air Conditioning and Refrigeration, Plastics Technology, Welding

Figure 13. Projected Use for Occupational and Vocational Education

New Applications/Systems For Occupational & Vocational Education Division: Below is a brief description of the academic applications or systems that may be investigated and/or used over the next three years.

INSTRUCTIONAL AREA	*APPLICATION/SYSTEM*
Radiographic Technology,	Intergraph Usage
Respiratory Therapy	Intergraph Usage
Architecture	Intergraph Usage
Manufacturing Technology	Temple graphics for numerical control
	CNC connect to lathe
	Interactive video
	Automated Manufacturing (Robotics, Inventory Storage and Retrieval)
Graphic Arts	Expansion of Desktop Publishing
Communication Arts and Sciences	Computer graphics for Presentation

Figure 14. New Applications or Systems for Occupational and Vocational Education

Natural Sciences

Description: The Natural Sciences Division integrates mathematics, the physical and natural sciences and physical education. Courses and curricula are designed to develop knowledge, skills and attributes applicable to non-academic life; mastery of the scientific method; ability to organize resources toward solving a specific problem; and unbiased analysis of quantitative data. Physics, chemistry and earth sciences deal with natural laws, and theories and their applications to man's needs. Universal phenomena are studied and analyzed. The biological sciences examine the components of the living world and their interactions with the physical world. Applications of science to man, the world and the way we live with the world are made frequently. Engineering and technology combine the principles of science with judgment to transform materials and energy for the technological improvement of man's life. Mathematics provides the tools and skills to organize our thoughts and apply problem-solving techniques. It helps students better understand the quantitative relationships found in business, technology and the physical, natural and social sciences. Physical education (the study of motion) stresses the gainful use of recreational and leisure time, the spirit of both cooperation and personal accomplishment, and the development of a physically healthy way of life.

The Natural Sciences area accounts for 10 percent of students enrolled in classes which use computers on Central Campus. Currently five of nine instructional areas now use computers. Usage is highest for the mathematics and biology areas. Other areas of usage include chemistry, and engineering.

Students in the Natural Sciences area make use of the Mainframe Computer Lab (SRC 2003A), the Instructional Microcomputer Lab (SRC 3021), the Engineering Graphics Lab (IC 1017) and the Plato system.

Projected Usage: Computer usage over the last year has remained constant. An increase of 22 percent over FY 1987 usage was projected by FY 1990 which results in approximately 120 additional students enrolled in courses which use computers (refer to the following figure). This increase is due to expansion in the use of Plato by the biology area, expansion in the use of microcomputers by the math area and use of computers in the fitness lab by the physical education area. The following figure shows the percent increase that is anticipated over the next three years and lists those areas where there is no anticipated or current usage of computers.

NATURAL SCIENCES

AREA	*FY1987*	*PROJECTED STUDENT INCREASE* *FY1988*	*FY1989*	*FY1990*	*TOTAL INCREASE 1988-90*
Math	203	10	10	10	15%
Biology	178	9	9	9	15%
Chemistry	101	5	5	5	15%
Engineering	47	0	0	0	0%
Physical Education/Athletics	0	0	30	15	45 Students
Botany	25	1	1	1	12%
Total No. of Students	554	25	55	40	Net 22%

NO USAGE AND NO INCREASE:

Physics, Earth Science, Anatomy and Physiology

Figure 15. Projected Use for Natural Sciences

New Applications/Systems for Natural Science: New Applications/Systems have not been identified for the Natural Science area. Usage of Plato was projected to increase, but specific applications were not identified.

Open Campus

Six instructional areas of Open Campus are described in the following sections in terms of an instructional or support objective along with projections on areas of new computer usage and the new applications or systems that may be involved. Again, projections have been made (based on the results of the Academic Computing Departmental Survey) as to the increase in student usage that is expected over the next three years.

Academic Alternatives

The Academic Alternatives area includes the Testing and Alternative Credit program, the Instructional Alternatives program, and the Instructional Design office. Each of these areas is described below.

Testing and Alternative Credit

Description: The Testing program at the college uses various tests and inventories to provide students with information about their career interests and abilities in order to help them select a viable course of study. The areas of testing include:

- Career, Interest and Personality Testing - used to compare a students interest and temperament with other people employed in various occupations or in a select sample.
- Career Planning Program - used by students to gain a range of knowledge about their vocational interests and abilities, as well as other important characteristics that are helpful in selecting an area of study.
- Pre Course Testing - used to measure skills and provide advice to students intending to enroll in English 101 and Math 110.
- Testing for On-Going Courses - provides testing for individualized courses, telecourses and make-up examinations.
- Admissions Testing for Health Program - Administers admissions tests for the Associate Degree for Nursing, Licensed Practical Nursing and the Allied Sciences.
- Credit by Demonstrated Competence Testing - Allows students to gain credit for knowledge acquired in an occupation, or other situations outside of college.
- Special Purpose Testing - specialized tests for a specific purpose or area of instruction.

Test results and interpretive information are provided to students and these results are discussed and utilized by the Counseling area.

The Testing and Alternative Credit area has only just begun to use computers for administration, storage and analysis of test results.

Instructional Alternatives

Description: Instructional Alternatives delivers courses in ways alternative to classroom-delivered instruction. Course delivery methods include telelearning (students learn through various media and combinations thereof), flexible learning (self-paced completion of regular catalog courses), experiential learning (courses which combine field experiences and classroom instruction), interdisciplinary studies (where two disciplines are blended), remedial/developmental skill building (individualized instruction in basic skills and study skills), Adult Basic Education, GED instruction, Literacy and English-as-a- Second Language. Although there are distinct differences between delivery modes and content in these different programs, all programs delivered through Instructional Alternatives emphasize less traditional modes of learning which meet the needs or interests of community members.

All programs are currently delivered through the Learning Laboratory on the Glen Ellyn campus and at four neighborhood Learning Centers located in Naperville, Glendale Heights, Hinsdale, and Lombard. Increasingly, both the modernization of growth of education delivered in non-traditional ways and at off-campus locations depends on the incorporation of computer-based instruction and record keeping into this area.

Computer use in the Learning Lab accounts for three percent of students enrolled in courses which use computers in Academic Alternatives. Currently four of six course delivery methods now use computers. These include English-as-a-Second Language, remedial/ developmental skills building, adult basic education and flexible learning options.

Students using the Learning Lab make use of the Apple II microcomputers and Plato terminals located in the lab as well as the Instructional Microcomputer Lab (SRC 3021) and the Plato system.

Projected Usage: Computer usage in the Learning Lab over the last year has increased slightly. An increase of 343% over FY 1987 usage was projected by FY 1990 which may result in approximately 600 additional students enrolled in courses which use computers (refer to the following figure). Increased usage is expected for most alternative modes of delivery. Increased usage is also expected at each of the Learning Centers once students are provided with additional computer systems and software at these remote locations. The following figure shows the percent increase that is anticipated for each of these delivery methods over the next three years.

New Applications/Systems for Instructional Alternatives: The following is a brief description of the academic applications or systems that may be investigated and/or used over the next three years.

INSTRUCTIONAL AREA	*APPLICATION/SYSTEM*
Remedial/Development	Interactive Video
Flexible learning options	
ESL, Remedial/Development	Expand use of Plato
Telelearning	Expand use of Plato
Flexible learning options	Work with Computer Services to develop applications
All Areas	Authoring system for the development of Instructional software
All Areas	Computer Text/Graphics generation program

Figure 16. New Applications or Systems for Instructional Alternatives

Alpha Program

Description: The Alpha program provides degree-oriented courses structured around major local, national or international field experiences. This program specializes in learning adventures, based on the idea that people learn best from real life experiences. The interdisciplinary study portion of the Alpha program combines the content and objectives of two or more courses into a single integrated learning experience.

The Alpha program accounts for 2 percent of students enrolled in classes which use computers for Academic Alternatives. These students make use of the Instructional Microcomputer Lab (SRC 3021) and the Plato system.

Projected Usage: An increase of 500% was projected over current FY 1987 usage which will result in approximately 360 additional students enrolled in courses which use computers (refer to the following figure).

New Applications/Systems for the Alpha Program: Usage of Plato was projected to increase but specific applications were not identified. Other computer applications include:

- Use of bird migration data base for field research in ornithology
- Statistical analysis of data collected in field

Instructional Design

Description: The Instructional Design Office helps instructors develop new course materials and alternative methods of delivering existing courses. It assists all units of the college in planning, designing, developing, and evaluating new delivery systems, and monitors alternative delivery strategies during their field test.

Instructional Design area is actively involved in the investigation of new computer-based applications and in the use of computers as an alternative method of delivering or supporting existing courses. Plato usage throughout the college is promoted and supported by the Instructional Design area.

Projected Usage: The Office of Instructional Design projects a significant increase in the use of microcomputers and Plato assets over the next three years. A one-and-a-half fold increase in Plato usage was projected over current FY 1987 usage which could result in 1,440 additional students enrolled in courses which use Plato. Faculty as well as students will account for this increase. Improved educational software, new microcomputer facilities, a new thrust by the Office of Instructional Design and a new pricing structure for Plato will be factors in this projected increase.

New Applications/Systems for Instructional Design: The Office of Instructional Design will become more heavily involved in the development of computer-based interactive video projects, evaluation of authoring systems, investigation of network-based computer alternative instructional systems, educational management systems and other applications of computer technology to instruction. Because the Office of Instructional Design helps to support college-wide instruction, many of the specific computer based instructional projects are listed in the plans for the other instructional units of the college. For this reason, they are not listed here.

ACADEMIC ALTERNATIVES

AREA	*FY1987*	*PROJECTED STUDENT INCREASE FY1988*	*FY1989*	*FY1990*	*TOTAL INCREASE 1988-90*
ALPHA ONE					
Field Experience	42	60	60	60	429%
Interdisciplinary Studies	30	60	60	60	600%
Total No. of Students	72	120	120	120	Net 500%
LEARNING LAB					
English As A Second Language	10	10	10	10	300%
Remedial/Development	10	10	10	10	300%
Adult Basic Education	10	10	10	10	300%
Literacy	0	10	10	10	30 Students
Flexible Learning Options	40	30	30	30	225%
TeleLearning	0	0	0	30	30 Students
Total No. of Students	70	70	70	100	Net 343%
INSTRUCTIONAL DESIGN					
Plato	960	480	480	480	150%

Figure 17. Projected Use for Academic Alternatives

Regional Centers

Description: The Regional Centers provide information, registration assistance and advising services to individuals at three off-campus locations. These include the Naperville Southwest Regional Center, Addison North Regional Center and Hinsdale East Regional Center. Off-campus credit classes follow established course outlines, maintain high standards of instructions and are fully interchangeable with classes offered on campus. The Regional Centers also support non-credit classes.

The Regional Centers account for 20 percent of students enrolled in classes which use computers in Open Campus. These include accounting, data processing, office careers, the Kids on Campus program and off-campus courses in the natural sciences/social and behavioral sciences.

Off-campus computer resources include an Apple II Lab at a junior high school and nine IBM PC's at the Naperville Regional Center. Many students receiving instruction at off-campus locations must still return to the Central and Open Campus to use computer equipment. Each of the regional directors agree that there is a current and projected need for additional microcomputer and mainframe stations at off-campus locations.

Projected Usage: Computer usage over the last year has increased by 50 percent for the Regional Centers. An increase of 44 percent over current FY 1987 usage is projected by FY 1990 which will result in approximately 500 additional students enrolled in courses which use computers (see the following figure).

REGIONAL CENTERS

REGION	*FY1987*	*PROJECTED STUDENT INCREASE* *FY1988*	*FY1989*	*FY1990*	*TOTAL INCREASE 1988-1990*
Addison North	881	33	33	33	11%
Naperville Southwest	240	36	36	67	58%
Hinsdale East	30	90	90	90	900%
Total No. of Students	1151	159	159	190	Net 44%

Figure 18. Projected Use for the Regional Centers

New Applications/Systems for the Regional Centers: The following is a brief description of the academic applications that may be investigated and used over the next three years.

INSTRUCTIONAL AREA	*APPLICATION/SYSTEM*
Addison North Region	Central storage of course outlines
	Test bank program
	Applications programs
Naperville Southwest Region	Microcomputer network
Hinsdale Southeast Region	Scantron, entry and Testing by computer Statistics programs
All Regional Centers	Provide access to software now used on Central/Open campus at a remote computer site

Figure 19. New Applications or Systems for Regional Centers

Business and Professional Institute

Description: The Business and Professional Institute is designed to provide education, training and economic development assistance to business and professionals in District 502. Institute staff members will consult with businesses and organizations to determine training needs and design training programs. Training programs may be seminars, credit courses or non-credit programs designed for special needs. Programs may be offered on campus or at a place of business. The Institute also offers economics development assistance to businesses, chambers, associations or government agencies. Seminars promoting small business development and specialized small business assistance through counseling and referral are other services rendered to district businesses.

Within the Institute, the Regional Assistance Center provides a wide range of entry-level job skills retraining programs for qualified displaced workers.

Professional continuing education activities include, but are not limited to, seminars, workshops and conferences in data processing, nursing, manufacturing, management, human service, robotics, CAD/CAM, CPR and small business operation.

The Business and Professional Institute accounts for 8 percent of individuals enrolled in classes which use computers for Open Campus. Computers are used in support of data processing,

business, office careers and technology courses. The displaced worker program also provides entry-level computer training.

BPI instruction incorporates the use of the Intergraph CAD system, the Dual Unix system, the Office Careers Victor/Wang lab and the two BPI Data Processing labs.

Projected Usage: Computer usage for the Business and Professional Institute has increased by 28 percent over the last year. An increase of 57 percent over current FY 1987 usage was projected by FY 1990 which will result in approximately 280 additional individuals enrolled in courses which use computers (refer to the following figure.) This increase does not include projected growth of the Regional Assistance Center. The projected increase for BPI is based on the following considerations:

- The demand for computer training will increase in step with the growth of technology and number of businesses within our district.
- The need for training will increase as more complex applications are converted to microcomputers and become cost effective for small businesses.
- As the use of computers replaces many manual activities, the number of displaced workers will increase and be needed to operate these computers.

BUSINESS AND PROFESSIONAL INSTITUTE

		PROJECTED STUDENT INCREASE			*INCREASE*
AREA	*FY1987*	*FY1988*	*FY1989*	*FY1990*	*1988-90*
Regional Assistance Center	100	*	*	*	*
Illinois Youth Center	70	23	23	23	100%
DATA PROCESSING					
Implant	125	30	30	30	72%
Public Courses	193	40	40	40	62%
Total No. of Students	488	93	93	93	Net 57%

* Expansion is dependent on grant renewal

Figure 20. Projected Use for the Business and Professional Institute

Summary of Student Usage

The following figure provides a summary of the projected increase in student usage over the next three years for the college as a whole. Current usage is shown for comparison.

Units of student usage represents the number of additional students enrolled in courses which use computers.

SUMMARY OF GROWTH PROJECTIONS

MAIN CAMPUS

AREA	*FY1987*	*FY1988*	*FY1989*	*FY1990*	*TOTAL*
			PROJECTED STUDENT INCREASE		
Business & Services (B&S)	2864	580	680	685	4809
Humanities & Liberal Arts (HUM)	850	425	425	610	2310
Social & Behavioral Science (SBS)	575	80	80	115	850
Health & Public Services (HPS)	346	135	133	131	745
Technology (TEC)	349	181	236	213	979
Natural Science (NS)	554	25	55	40	674
Total No. of Students	5538	1426	1609	1794	10367
OPEN CAMPUS					
Alpha Program (ALP)	72	120	120	120	432
Learning Lab (LL)	70	70	70	100	310
Instructional Design (ID)	960	480	480	480	2400
Regional Centers (RC)	1151	159	159	190	1659
Business & Professional Institute (BPI)	488	93	93	93	767
Total No. of Students	2741	922	922	983	5568
Overall Total	8279	2348	2531	2777	15935

Figure 21. Projected Increase in Student Usage

Hardware Needs

Student Hardware Needs

Student Contact Hours

Students using computers at the college are expected to vary in the amount of time they need to complete their assignments. Some courses such as data processing or computer aided design/manufacturing are computer intensive and require more time while others may involve only one or two sessions per quarter at the computer. For this reason the following model was used to calculate student hardware needs based on the average number of contact hours per quarter.

Contact hours were calculated as follows:

- Each area of instruction was placed in one of the four categories that estimate the average level of use for each quarter. These categories are described below.

AVERAGE LEVEL OF COMPUTER USE BY STUDENT

Intensive	20 Contact Hours per quarter
High Use	10 Contact Hours per quarter
Moderate Use	5 Contact Hours per quarter
Low Use	2.5 Contact Hours per quarter

Figure 22. Average Level of Computer Use By Student

The highest level of use, 20 contact hours per quarter, represent the current level of usage by data processing courses which are considered to be computer intensive. The next highest level of use, 10 contact hours per quarter includes courses such as English Composition, travel reservation, and mathematics. The next level of use, 5 contact hours per quarter includes courses in interior design, music, psychology, nursing, radiographic technology, graphic arts, and biology as well as other areas of instruction. Some courses of low usage include real estate, food service administration, history, art, political science, chemistry, fire science and automotive technology.

- The average level of contact hours per quarter per student was multiplied by the number of current and projected student users from each course to determine the total contact hours per quarter that are needed.

The following figure provides a summary of the current and projected increase in student contact hours for each area of Central and Open Campus. FY1987 represents current usage. FY1988, FY1989 and FY1990 are the projected increase in the number of contact hours per student for the next three years. The FY88 - 89 values represent the increase in contact hours contributed by students now using computers as well as new users. Total contact hours represent the sum for FY1987, 88, 89 and FY1990.

SUMMARY OF GROWTH PROJECTIONS-CONTACT HOURS

		PROJECTED INCREASE			
AREA	*FY1987*	*FY1988*	*FY1989*	*FY1990*	*TOTAL*
CENTRAL CAMPUS					
Business & Services (B&S)	50420	7213	7713	7725	73071
Humanities & Liberal Arts (HUM)	8000	4040	4900	5585	22525
Social & Behavioral Science (SBS)	7600	700	700	788	9788
Health & Public Services (HPS)	1038	450	399	393	2280
Technology (TEC)	4685	2445	2645	2785	12560
Natural Science (NS)	3768	163	463	313	4707
Total Contact Hours	75511	15011	16820	17589	124931
OPEN CAMPUS					
Alpha Program (ALP)	180	300	300	300	1080
Learning Lab (LL)	225	225	225	300	975
Instructional Design (ID)	2400	1200	1200	1200	6000
Regional Centers (RC)	10160	960	960	1115	13195
Business & Professional Institute(BPI)	8710	1515	1515	1515	13255
Total Contact Hours	21675	4200	4200	4430	34505
Institutional Total	97186	19211	21020	22019	159436

Figure 23. Summary of Growth Projections-Contact Hours

The following graph shows the current and projected contact hours by division for Central Campus. The number at the top of each bar represents the sum of current and projected contact hours. The highest usage and increase is seen for Business and Services followed by Humanities, Technology and the Social and Behavioral Science area.

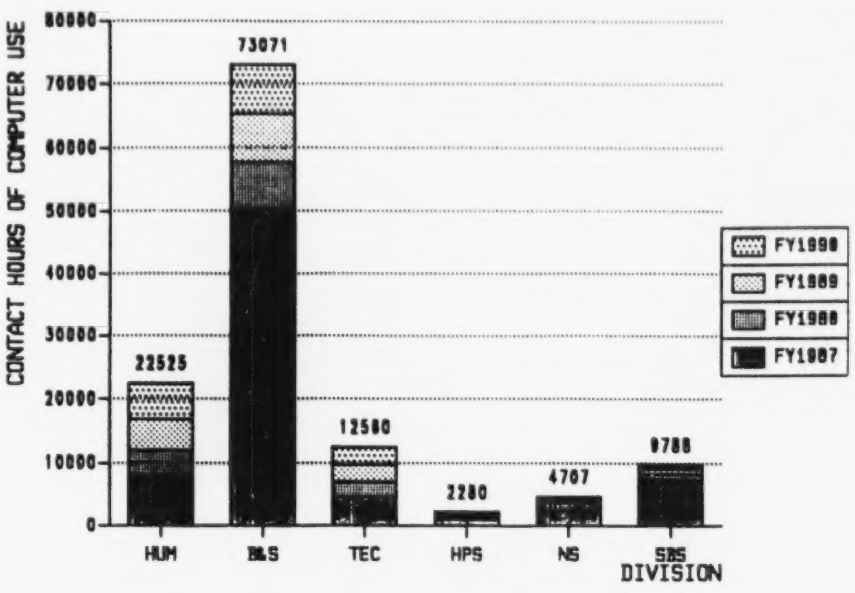

Figure 24. Central Campus - Divisional Usage - Contact Hours

The following figure shows the current and projected contact hours for each area of Open Campus. The number at the top of each bar represents the sum of current and projected values. The highest usage and increase is seen for the Business and Professional Institute followed by the Regional Centers, and Instructional Design.

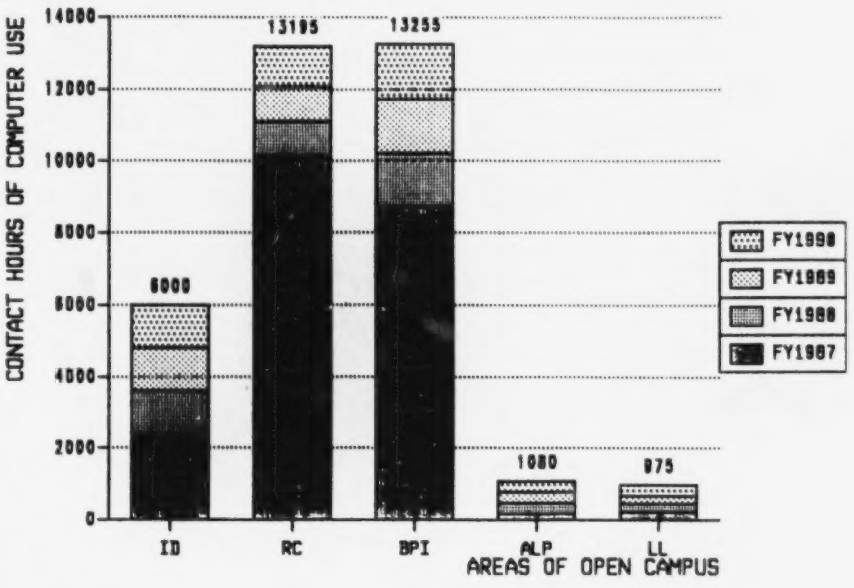

Figure 25. Contact Hours of Computer Use for Areas of Open Campus

In the following figure the projected increase in contact hours of computer usage is shown for both Central and Open Campus. The current usage in FY87 is 97,186 contact hours. By 1990 we expect usage to increase to 160,000 contact hours. Academic computer usage for the whole college is predicted to increase by 64% over the next three years, or an average increase of 21% each year.

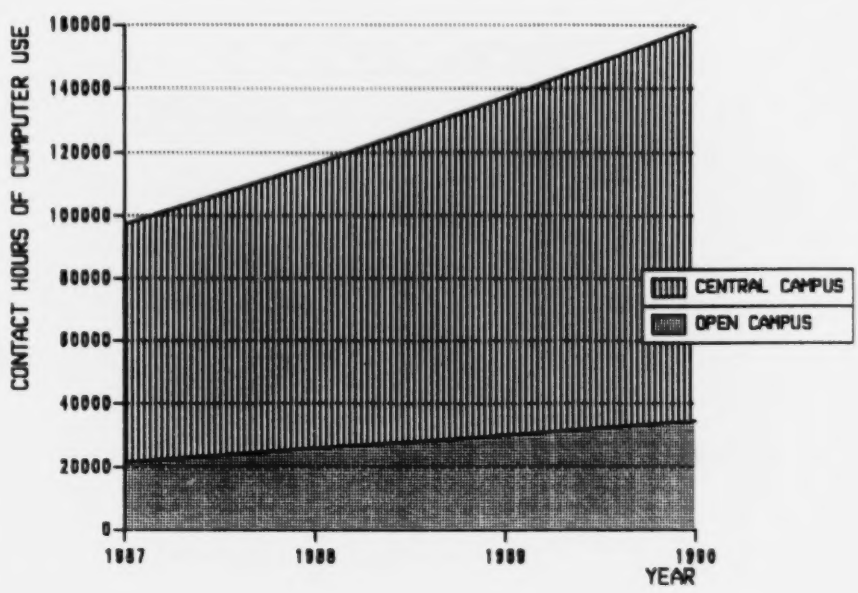

Figure 26. Contact Hours for Central and Open Campus

Workstation Availability

The following figure shows the different types of workstations available for student use. Included in the figure is the available hours, total contact hours used and percent saturation for each type of computer workstation at the college.

WORKSTATION AVAILABILITY

Hardware Type	*Number of Stations*	*Hours Available Per Workstation*	*Total Hours Available*	*Total Hours Used*	*Percent Saturation*
IBM PC	115	790	90850	74775	82%
Plato	10	800	8000	2400	30%
Apple II	10	800	8000	1060	13%
Intergraph	12	400	4800	2400	50%
IBM 4381	23	790	18170	9130	50%
Wang OIS	8	750	6000	2000	33%
Unix System	6	200	1200	820	68%
TRS 80	8	800	6400	500	8%

Figure 27. Workstation Availability/Per Quarter

The figure is described as follows:

- *Hardware Type* represents the different microcomputers and terminals on campus.
- *Number of Stations* represents the current number of computer stations for each type of hardware.

- *Hours Available per Workstation* are the number of hours each quarter that students have access to each type of hardware. A 10 week quarter was used to determine hours available each week, i.e. IBM PC would be available on an average of 79 hours per week for student access.
- *Total Hours Available* was calculated by multiplying the *Number of Stations* by the *Hours Available per Workstation.* This value represents the total station-hours available for each type of hardware.
- *Total Hours Used* was calculated from data obtained by the Departmental Survey after making an estimate of the contact hours used by each student for each instructional area. Student contact hours were calculated for each instructional area for the next three years and grouped by type of hardware. *Total Hours Used* represents the contact hours that were used by students in the Fall quarter - 1986 for each type of hardware.
- *Percent Saturation* The total hours used was divided by the total hours available to determine the average percent of the time that each type of hardware was used. The percent saturation represents the average percent occupancy for each type of hardware and is used as a measure of workstation availability.

The TRS80, Apple II, Plato and Wang OIS have the lowest percent saturation while IBM PC and Unix stations exceed 60% saturation. Intergraph and IBM 4381 are at 50% occupancy.

Workstation Utilization

Workstation utilization was compared for each type of hardware by calculating the number of contact hours that students spend at each type of workstation each quarter. The following figure shows the current level and a recommended standard of contact hour usage per workstation per quarter.

WORKSTATION UTILIZATION

	CURRENT USAGE	*RECOMMENDED STANDARD*
IBM PC	650	474
Plato	240	480
Apple II	106	480
Intergraph	200	240
IBM 4381	397	474
Wang OIS	250	450
Unix System	137	120
TRS 80	63	480

Figure 28. Workstation Utilization In Contact Hours

The current usage is the actual number of contact hours utilized by students for each individual workstation. The standard usage is the recommended number of contact hours that each workstation should be utilized per quarter. The recommended standard value is based on 60% of the current lab hours that are available for each type of hardware. On average, when the workstation utilization exceeds 60% of available hours, student lines start to form and users receive less than adequate service.

The following figure compares the current and the recommended standard for each type of hardware. The IBM PC and Unix computer systems currently support more student contact hours than are prescribed by the recommended standard.

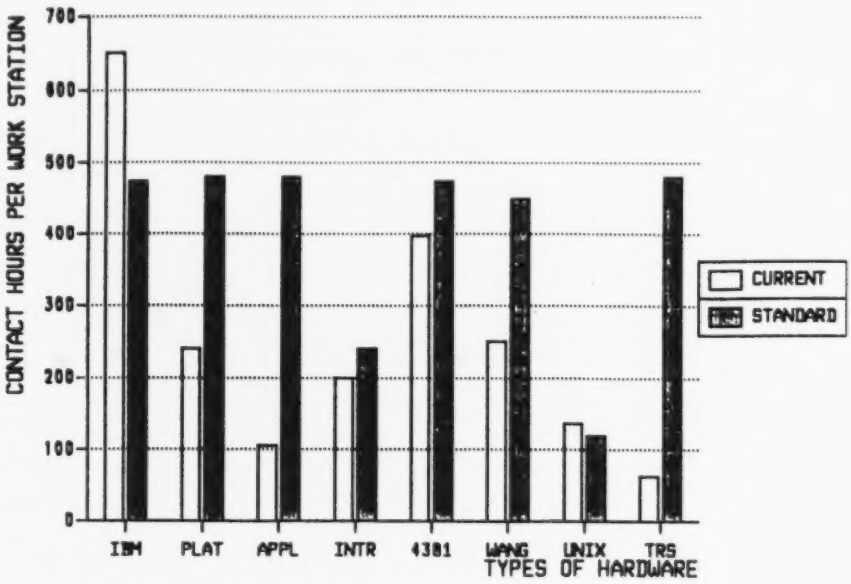

Figure 29. Contact Hours per Workstation by Type of Hardware

Projected Usage of Hardware

In order to identify the type of computer hardware which will be needed to support the projected growth in Academic Computing over the next three years the following computations were made:

- The current student contact hours were grouped by type of computer hardware.
- For each type of computer hardware the number of additional contact hours above FY1987 were estimated for each FY1988 - 1990.
- The projected increase in contact hours was totalled for each type of hardware.

The following figure shows the projected usage of computer hardware by type of workstation. The figure shows the current (FY1987) and projected (FY1988, 1989, 1990) increase in contact hours.

PROJECTED USAGE OF COMPUTER HARDWARE

INCREASE IN CONTACT HOURS

Hardware Type	*FY1987*	*FY1988*	*FY1989*	*FY1990*	*Total*	*Increase*
IBM PC	74775	10244	10763	11725	107507	43.7%
Plato	2400	1200	1200	1200	6000	150%
Apple II	1060	1000	1000	1000	4060	283%
Intergraph	2400	887	1513	1618	6418	167%
IBM 4381	9130	-440	-440	-440	7810	-14.5%
Wang OIS	2000	660	660	660	3980	100%
Unix System	820	820	820	820	3280	300%
TRS 80	500	-125	-125	-125	125	75%
Macintosh	1000	1150	1150	1150	4450	345%

Figure 30. Increase in Contact Hours

The usage of Macintosh, Unix and Apple II systems are expected to increase most rapidly while IBM PC, Plato and Intergraph usage is expected to contribute to the highest number of total contact hours. The IBM 4381 and TRS 80 usage will decrease The above table is shown graphically in the following figure. The number at the top of the bar represents the number of contact hours that are predicted for each type of hardware through FY1990. This figure shows that the projected growth in computers use will involve primarily IBM PC microcomputers, Unix and the Intergraph system with needed expansion of Macintosh systems.

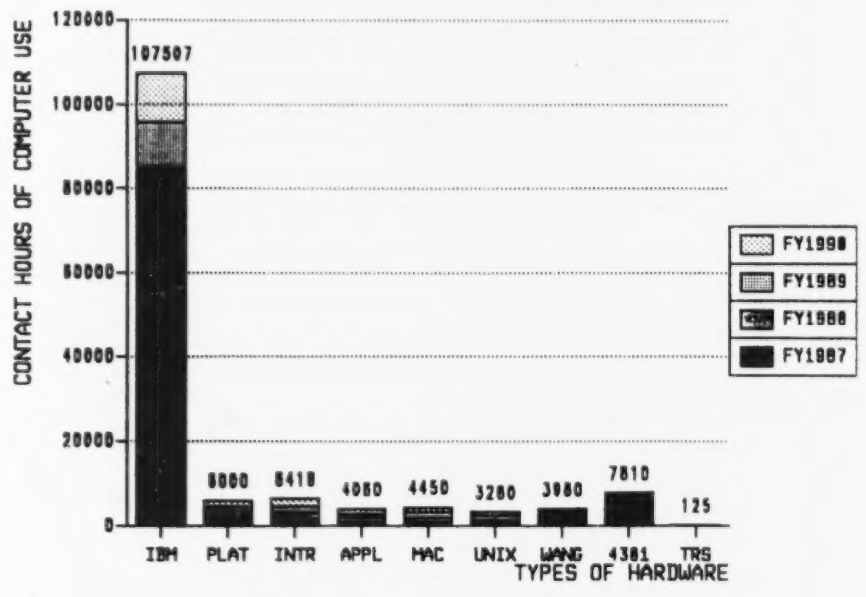

Figure 31. Contact Hours of Computer Use by Type of Hardware

Recommendations - Students

The projected increase in contact hours that was forecast for the next three years has been used to estimate the number of additional computer stations that will be needed.

The following figure shows the number of additional workstations that are needed based on the recommended standard defined previously. This figure shows the current level of hardware support and the projected number of workstations needed for the next three years. The number of additional workstations was calculated by dividing the projected number of contact hours by the recommended standard of contact hours that is supported by one workstation.

		PROJECTED NUMBER OF ADDITIONAL WORKSTATIONS NEEDED*		
HARDWARE TYPE	CURRENT	FY1988	FY1989	FY1990
IBM PC	115	16	17	18
Plato	10	0	0	5
Intergraph	12	4	4	3
Apple II	10	0	0	0
Wang OIS	8	0	0	3
Unix System	6	6	6	6
Macintosh	5	5	5	5
IBM 4381	23	-1	-1	-1
TRS 80	8	-2	-2	-2

Figure 32. Projected Number of Additional Workstations Needed

The following recommendations provide the hardware and directional information to meet the growth in student computing for the next three years.

- **Expand computer lab resources.**

  Projections of student usage over the next three years warrant the expansion of current computing hardware resources. This is especially true of Intergraph, IBM PC, Plato and Unix based systems. Estimates of the number of additional stations that are needed include IBM PC compatibles (51), Plato (5), Intergraph (11), Unix (18) and Wang (3) over the next three years. Most of these units will be used in the microprocessing center.

  Printed results are essential in verifying that students have completed computer-related assignments. Many of the labs are in need of additional printers, as well as high quality text processing and graphic devices. It is recommended that sufficient output devices be purchased for the microprocessing center.

- **Provide IBM PC compatible equipment.**

  We should investigate the use of IBM PC compatible equipment for use on campus. If compatibles can be used, the institution can save 20% on PC purchases. If compatibles are acceptable, only two or three types should be acquired.

- **Centralize student lab facilities.**

  Present space limitations have limited the expansion of existing lab facilities to accommodate growth in the use of computers. The proposed microprocessing facility will allow for both the expansion and centralization of computing resources. Because of the many advantages that will result through the merging of existing lab facilities, it is recommended that as many lab facilities as possible be placed in the microprocessing facility. This facility should have some form of power backup. The centralized lab should be set up as a computer network to allow for distribution of software and central management and control.

- **Increase student access outside of lab facilities.**

  Student access to computers can be increased by providing:

  - Additional microcomputers on loan to students through the LRC and labs

- Increase in the number of dial-up lines to the mainframe and minicomputer systems
- Additional portable or dedicated projection system for use in the classroom

- **Shift toward multiuser workstations.**

  Recent trends would indicate that academic hardware resources are moving in the direction of powerful multiuser workstations which are linked together and able to support a wide range of applications and operating systems. The college should shift towards this type of resource and begin to network these stations to some of the other systems at the college. The goal is to create a machine-transparent environment where every workstation can act as an access point to every system.

- **Expand computer resources in regional centers.**

  It is recommended that additional computer resource be placed at the Regional Centers. This includes mainframe terminals, microcomputers and access to the other minicomputers at the college. In particular, the Hinsdale Center will need ten IBM PC's with related equipment and software in FY88.

- **Add terminals to the AT&T 3B5 system.**

  Problems with the reliability, security and repair of the Dual-Unix system required replacement with an AT&T 3B5 Unix based system. Recently an AT&T 3B5 system was donated by AT&T to the college which is able to support four times as many workstations. Not included in the donation were computer modems, terminals or printers. These peripherals need to be purchased.

- **Monitor system utilization.**

  Each computing lab should be monitored on a quarterly basis to collect usage data on the computer systems. This will provide accurate data on computer usage. We should find out how long students are in the lab and what courses they are working on.

Faculty Hardware Needs

Faculty Usage of Computing Resources

As described in the current environment section, most faculty must share microcomputers with other faculty or administrative staff in the divisional areas, or students in the various lab facilities. Faculty also have limited access to mainframe, minicomputer or Plato terminals. The importance of providing faculty with access to computers has been described in that section. If microcomputer resources are expanded, faculty have indicated where they would like to see them placed.

In the Academic Computing Survey, faculty were asked to prioritize where they would like to see an increase in microcomputer stations. The choices included placing computers in faculty offices, a shared faculty work area, computer lab facilities, or individual classrooms. The majority of faculty selected microcomputers in faculty offices as the highest priority followed by computers located in a shared faculty work area as second in priority. Additional microcomputers for lab or classroom instructions were placed at a lower priority. Half of the faculty who answered this question did not at the time use computers. It is felt that they selected computers for their office as a necessary first step in becoming computer literate. This is a reasonable and productive choice since faculty must first become computer literate before using computers in instruction. The purchase of additional computers for faculty was seen as necessary to support projected growth in use of computers and to promote new computer use.

Projected Usage of Hardware - Faculty

The Academic Computing Department Survey found that most areas of the college were in need of additional computers for faculty use and that all areas requested either IBM PC, Apple or

Macintosh microcomputers. The following two figures show the total number of microcomputers which were requested for Central or Open Campus. These requests are projected for the next three years.

		Projected Need Number of Microcomputers		
	FY1987	*FY1988*	*FY1989*	*FY1990*
Central Campus	40	58	80	103
Open Campus	17	29	41	52
Total	57	87	121	155

Figure 33. Projected Need for Faculty Microcomputers

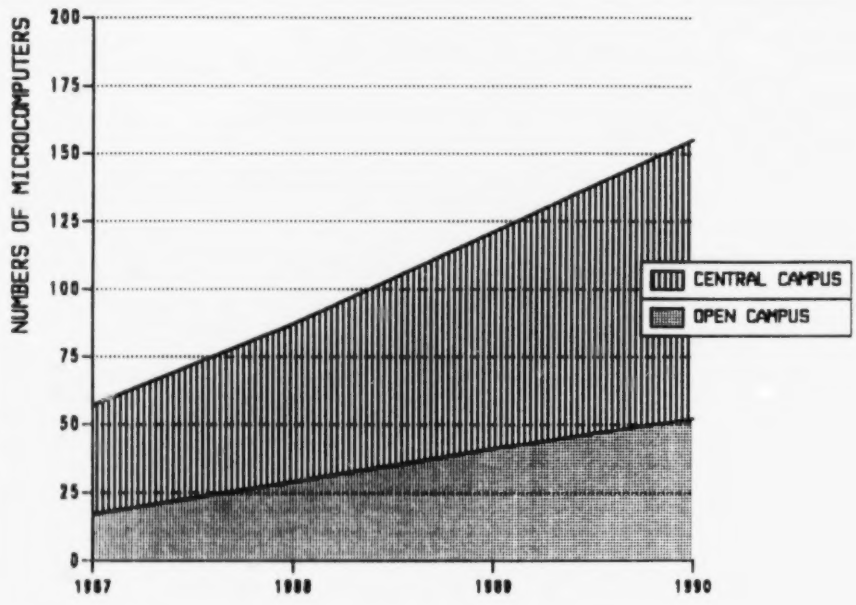

Figure 34. Projected Need for Faculty Microcomputers (Graph)

Recommendations - Faculty

The following recommendations will improve faculty access to computers and promote the growth of computer use:

- **Provide faculty offices with microcomputers.**

  Provide faculty offices with microcomputers to be used in support of these activities:

  - Preparation of course materials, management of instruction
  - Instructor-student consultation concerning computer-related assignments
  - Exploration of new applications, development of instructional software
  - Networked access to lab software

- Networked communications with other faculty or support staff

Specific requests include the purchase of 25 microcomputers, one to be placed in each faculty suite.

- **Provide a faculty work area.**

  As proposed by the Microprocessing Center Committee, a faculty work area is to be set up for course and program research or development. This area may be used to develop new course material, evaluate special equipment or the development of new applications.

- **Provide funding for the purchase/investigation of new computer technologies.**

  Money needs to be set aside for the purchase of new instructional/informational delivery systems (i.e. ROM Disk, interactive video, graphics, projection systems). A research and development fund under control of the Academic Computing Planning Committee could be made available to faculty and support staff for the development of new technology. Funding of these projects would be granted by the committee after review of the R & D proposal and its impact on the related areas of instruction.

Software Needs

Computer software is an essential a part of the academic computing process and fully as important as providing sufficient access to hardware resources. In order to support the present use of computers and provide an environment that will encourage growth in the use of computers, certain software needs should be met. These include:

- Management of the college software resources in order to provide for:
  - Central storage of microcomputer software
  - Software security
  - Efficient distribution and access to students
  - Distribution of informational materials
- Maintenance of existing software which provides for upgrades, backup and replacement
- Support in the selection and evaluation of new applications
- Funding for expanded use of existing applications and the purchase of new applications

Funding at an adequate level for the purchase of software is most important because it is essential that faculty be able to preview software and that adequate copies be available for student use. Multiple copies of software are needed for classroom instruction and these costs can equal and often exceed the cost of supporting hardware.

One of the objectives of the Academic Computing Department Survey was to evaluate the spending patterns for software in the current budget and project the amount of money needed in the years to come. Each area of the college was asked to project for the next three years the increase that is needed in their software budget. The following figure shows the current software budget for Central and Open Campus, the projected budget increase for FY88, FY89 and FY90 and the total increase for three years.

CENTRAL CAMPUS	PROJECTED SOFTWARE BUDGET *				
		PROJECTED BUDGET INCREASE			TOTAL INCREASE
AREA	FY1987	FY1988	FY1989	FY1990	1988-90
Business & Services (B&S)	6,000	10,000	10,000	10,000	30,000
Learning Resource Center (LRC)	4,000	4,000	4,000	6,000	14,000
Occupational & Voc. Ed. (OCC)	5,500	1,650	1,650	1,650	4,950
Social & Behavioral Science (SBS)	2,000	1,000	5,000	6,500	12,500
Humanities & Liberal Arts (HUM)	1,450	2,500	3,000	3,000	8,500
Natural Science (NS)	4,000	800	800	800	2,400
Total	$22,950	$19,950	$24,450	$27,950	72,350

Figure 35. Projected Software Budget for Central Campus

OPEN CAMPUS	PROJECTED SOFTWARE BUDGET *				
		PROJECTED BUDGET INCREASE			TOTAL INCREASE
AREA	FY1987	FY1988	FY1989	FY1990	1988-90
Business & Prof. Institute (BPI)	34,000	10,000	10,000	10,000	30,000
Regional Centers (RC)	100	6,860	6,860	6,860	20,580
Learning Resource Lab (LRC)	2,000	5,000	5,000	5,000	15,000
Instructional Design (ID)	1,000	1,500	1,500	2,000	5,000
Testing & Alt. Credit (T&AC)	500	1,500	1,500	1,500	4,500
Alpha Program (ALPA)	500	500	500	500	1,500
Total	$38,100	$25,360	$25,360	$25,860	76,580
Total for College	$61,050	$45,310	$49,810	$53,810	$148,930

* This does not include money used to purchase Dual Unix, Intergraph or IBM 4381 software.

Figure 36. Projected Software Budget for Open Campus

This data is graphed below as a cumulative bar chart for Central and Open Campus.

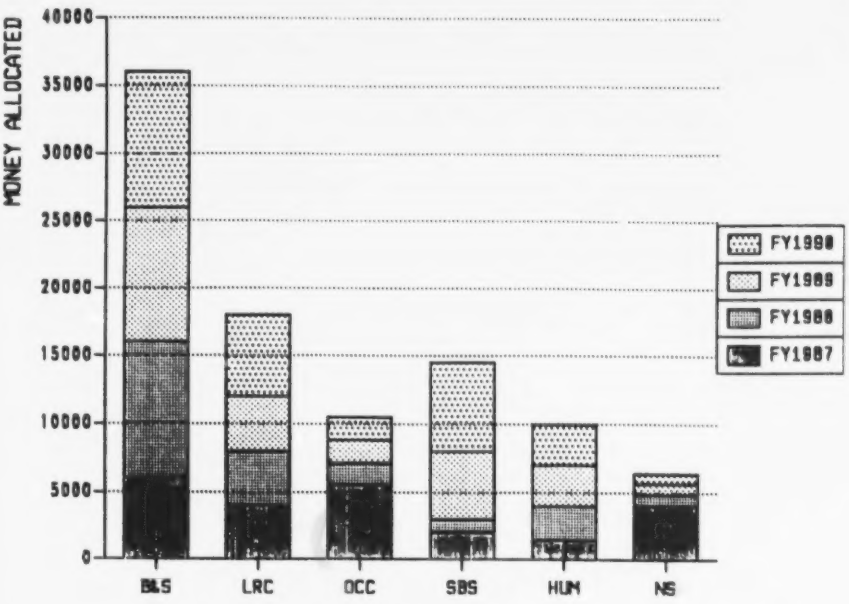

Figure 37. Projected Software Budget for Central Campus

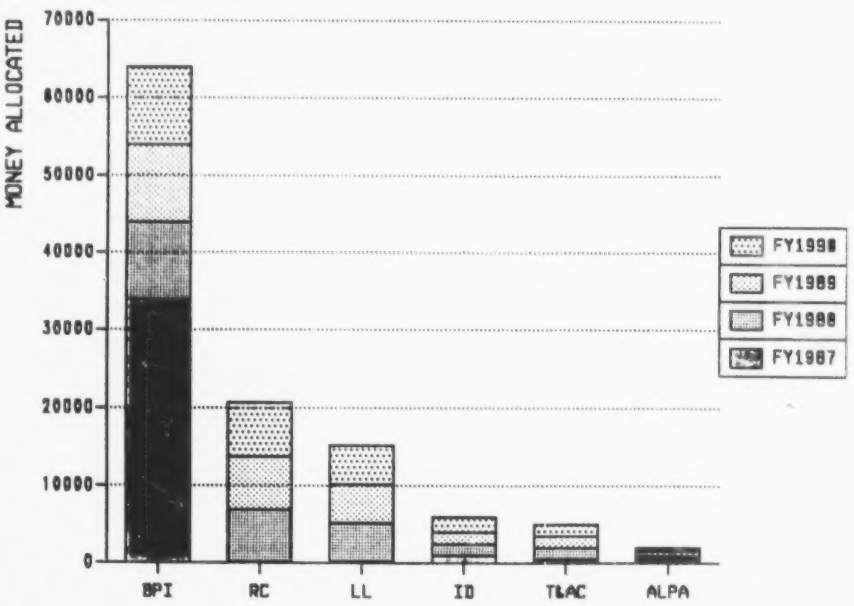

Figure 38. Projected Software Budget for Open Campus

The next figure shows the projected budget increase for the college as a whole. The total amount of money budgeted for software for the college was found to be $61,050. The total amount of additional money that could be spent over the next three years totaled $148,930, or an average increase of $49,643 each year. This represents a 244 percent increase for three years, or about an 80 percent increase each year.

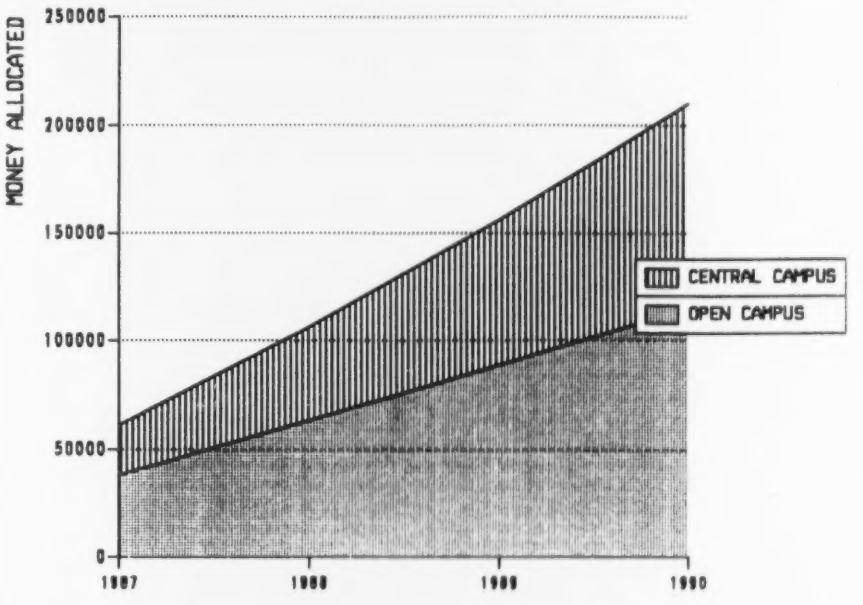

Figure 39. Projected Software Budget for the College

The second part of the faculty survey was used to determine how this money would be spent. From a list of twelve categories of software, faculty were asked to prioritize those applications that they considered as most important. Listed below are these categories and the percent of the sample (85 respondents) which selected each category.

Category	*Response*
Word Processing	67%
Microcomputer assisted instruction	60%
Integrated software (i.e. Framework, Apple Works, Symphony)	52%
Plato assisted instruction	49%
Statistical program	46%
Micro-data base (i.e. PFS File, DBase II)	45%
Micro-class management software	41%
Micro/Mainframe - Graphics, CAD	40%
Communication programs (Micro to Mainframe)	40%
Authoring languages (used to create institutional software without using Basic or Pascal)	33%
IBM 4381 Language/Tools	32%
IBM 4381 Data Base - Fourth Generation Language	32%
Test scoring programs	28%
Math oriented languages (APL, Prolog, Lisp, Logo)	2%

Figure 40. Faculty Software Priorities

In the next planning cycle faculty will be asked to identify those curricula where the use of computers would be of benefit to students. Faculty will also be asked to identify the specific computer applications that need to be purchased or to provide specifications for programs that must be written in-house.

Recommendations

The following recommendations relate to the management and growth of computer applications:

- **Involve more faculty in the search for instructional applications.**

  Leadership is needed in organizing those activities which promote the search for new applications. This includes those steps involved in identifying and integrating software into instruction. These may include:

  - Curricular evaluation and development
  - Selection and preview of software
  - Review of software purchase
  - Integration of software into instruction
  - Integration of software into lab facility and preparation of student support materials.

  Because faculty involvement is essential for the identification and evaluation of instructional applications incentives need to be provided which will encourge them to take an active role in the process. Some incentives include release-time, summer pay, the possibilities of royalties, funding of R & D projects and peer recognition for individual achievement.

- **Provide faculty with the tools needed to develop instructional software.**

  Many commerical software products do not ideally fit into course instructional objectives. The quality of software developed in-house often far exceeds what is commericially available. Also the specific curricular needs of a course are not always met by software that is available commericially. With the proper tools and incentive, faculty can develop instructional software which is tailor-made to the course they teach. Some of these tools include:

  - Spreadsheets, data base and integrated software
  - Templates for programming code for CAI
  - Authoring languages

  It is recommeneded that these tools be provided to faculty so as to encourage the development of software.

- **Establish a centralized software budget.**

  Money spent on computer software is currently not an item currently not an item budgeted for by individual areas of the college. As a result some areas have much more money to spend than others and some requests for software are not readily satisfied. It is recommended that a college-wide software budget be established which will allow for the purchase of software as needed by faculty and students. This budget will not include current monies allocated for software purchase at the college. A centralized software budget will provide the following advantages over the current situation:

  - Requests for computer software will be reviewed and the use of the software monitored after purchase.
  - All instructional areas will have an equal opportunity to purchase software.

- All software purchases can be identified at the time of purchase and incorporated into the college Central Library of Software.

- A portion of the software budget can be used by Instructional Design, the LRC, Computer Services and Academic Computing Planning Committee to investigate software applications which have impact on all areas of the college. These include:

  New instructional/informational delivery systems.

  Software development tools, such as application shell software, authoring systems and programming languages.

  Specific software programs to be made available to all faculty as an aid to the management of instruction.

It is recommended that the requests for software be reviewed by the Academic Computing Planning Committee which will be responsible for the disbursement of monies from the centralized software budget.

- **Maintain an inventory of software for the college.**

  As software is purchased, information will be collected for each item and added to a software data base. Instructional areas will be notified of these purchases. Students need to be notified of software that is available.

- **Investigate and purchase public domain software.**

  In some instances public domain software is the least expensive solution to an instructional software need because multiple copies can be made at no charge. These items should be investigated and purchased.

- **Investigate site license purchase of software.**

  Purchase of software for faculty or lab areas through the license agreements can lower the cost per station and improve access to microcomputer software.

- **Standardize application and systems software.**

  When possible, steps should be taken to adopt and promote standards for the various general-use programs such as word processing, data base, graphics, communications and operating systems software.

Support Needs

As described in the first section of the Academic Computing Plan, the support and services provided to faculty and students in using computers are an essential part of the Academic Computing process. Support in the use of computers is a major challenge to those individuals at the college which are responsible for the management of computer lab facilities and systems. Equally important is the help provided to faculty who are using or will begin to use computers. The effort needed in supporting the academic computing process is expected to increase over the next three years for these reasons:

- As student use of computers increases more lab aides will be needed to maintain current levels of support. Plans are now underway for the creation of three new computer labs and the consolidation/expansion of existing lab facilities.

- As more faculty begin to use computers, support will be needed to work with these faculty and search for new applications.

- As additional specialized computer systems are put into operation these will require individuals who are experienced in using these systems.

- As students and faculty are provided with new capabilities (i.e. microcomputer networking, electronic mail and the use of the AS Fourth Generation Language) the use of these unifying systems will also need to be supported.

Student Support

Student support in the use of computers is provided at three levels:

- The first level is the lab aides found in most, but not all of the computer labs. The support provided by the lab aides is limited to the basic operation of hardware and software but does not encompass specific questions about each application used in the lab.
- The second level of support is provided by the four lab supervisors who manage the labs and handle special requests or circumstances.
- Most other questions that students have concerning the use of software as it relates to class instruction are handled by the faculty member who is teaching the class. For the general use labs, this help is not available within the lab and is provided only at times that the faculty member is available to help the students. Student use of dedicated computer systems which are located in specific areas of instruction depends entirely on faculty for support.

The current level of support provided to students was determined by dividing the total number of support FTE (12.6)[2] by the number of students enrolled in classes which use computers (11,319). This value 1.1 FTE/1000 students represents the current level of student support in the general-use computer labs.

Community College Comparison - Student

A comparison was made between the current level of student support at the College of DuPage and the number of FTE support positions provided by the other colleges. Again, the level of support was calculated by dividing the total number of support FTE by the number of students using computers. As shown below, the average FTE/1000 students was 2.8 for all the colleges as compared to 1.6 for the College of DuPage. These results suggest that the number of person hours dedicated to student support the College of DuPage is less than at other colleges.

STUDENT EMPLOYEE SUPPORT FOR COMPUTING

	Student Employees (FTE)	*Ratio FTE Per 1000 Students*
College of Lake County	11	4.7
Prairie State College	1	3.3
Joliet Junior College	5	4.2
Waubonsee Community College	3	1.2
Kishwaukee College	1	1.8
Spoon River College	1.55	-
College of DuPage	12.6	1.6
Average		2.7

Figure 41. Student Employee Support for Computing

[2] This value was determined by totaling the lab aide hours for all the computer labs and adding 3/4 of the hours provided by the four lab supervisors.

Recommendations - Student

Based on projected increases in student usage and assuming that over the next three years the current level of student support will be maintained, projections have been made for the number of student employees in FY88 to FY90 that will be needed. As indicated in the figure below an additional 6 to 11 lab aides will be needed each year for the next three years.

Lab Support Projections
(Number of Lab Aides)

FTE/1000 Students	*1987-88*	*1988-89*	*1989-90*	Total *1989-90*
1.6	6.1	9.2	11.1	26

Figure 42. Student Support Projection

- **Provide improved support for students.**

  Centralization of computer labs will provide for greater efficiency in the support of students and allow for an increase in the services provided by lab aides. Still projections of future computer use indicated that additional lab aides will be needed over the next three years to compensate for doubling the hours of operation. It is recommended that five lab aides be hired each year over the next three years. It is also recommended that students with high levels of computer expertise assume the role of student consultants and provide these additional services:

  - Provide orientations to students on the use of computer systems in the microprocessing center.
  - Aid students in the selection of microcomputer, mainframe and Plato software.
  - Consult on the use of application, program debugging and the completion of student assignments.
  - Help with the maintenance of the microcomputer software collection which includes the documentation of software applications.
  - Work with faculty in developing student outlines for computer assignments.
  - Help with the management of the proposed computer network.

  It is recommended that one lab consultant be available at all times the microprocessing center is open. It is also recommended that these lab consultants be paid more than the current hourly rate that is paid to lab aides.

- **Establish a faculty-student support area.**

  It has been proposed that the microprocessing center contain two or three offices to be used by faculty for research and development activities and for individual consultation with students.

- **Establish a student support network.**

  Part of the computing knowledge network referenced in the faculty support section can be devoted to the support of student computer use. Each class can have access to an information account on the network which allows for communication with faculty, lab support staff and other Academic/Administrative areas of the college. The student support network will improve communication between present areas of support and the increasing number of students using computers.

Faculty Support

Computer support is provided to faculty from the following areas:

- Computer Services
  - One Manager Academic Computing
  - One Systems Programmer
  - One Senior Programmer Analyst
  - One Programmer Analyst
  - One Lab Supervisor
- Technology
  - One faculty member responsible for CAD System
- Instructional Design
  - One Director of Instructional Design
  - One faculty member responsible for Plato/KSVP
- Learning Resource Center
  - One Lab Supervisor
- Lab Supervisors associated with the BPI computer lab/the Office Career Lab
- Other faculty and administrators from Central and Open Campus

The current level of support provided to faculty was determined by dividing the total number of full-time employees in FTE (6.25) by the number of full-time faculty (225). This level of support, 2.8 FTE/100 faculty is compared below with the level of support at other colleges.

Community College Comparison - Faculty

A comparison was made between the current level of faculty support at the College of DuPage and seven other colleges. As shown below, the average FTE/100 faculty was 2.4 for all colleges as compared to 2.8 for the College of DuPage. These results suggest that the number of person-hours dedicated to support of faculty at the College of DuPage is greater than at other colleges.

FULL-TIME EMPLOYEE SUPPORT FOR FACULTY

	Full-Time Employee (FTE)	*Ratio FTE Per 100 Faculty*
College of Lake County	1.8	1.0
Illinois Valley Community College	2	2.5
Prairie State College	0	0
Joliet Junior College	.6	.35
Waubonsee Community College	1.1	6.8
Kishwaukee College	1	-
Spoon River College	1	3.2
College of DuPage	6.25	2.8
Average		2.4

Figure 43. Faculty Support Comparison

Faculty Support Evaluation

In the Academic Computing Survey, faculty were asked to evaluate the level of importance of support provided in ten areas. The level of importance was rated on a 4 point scale with a value of 4 designated as the highest level of importance. A mean value was calculated for each area of support and these results are shown in the following figure.

SUPPORT AREA NEEDS

Area	*Ratio*
Information Management	3.28
Documentation of hardware/software	3.14
Integration of software into instruction	3.09
Identification and evaluation of software	3.07
Computer Training	3.07
Personal consulting on the use of hardware or software	2.98
Computer programming in the development of instructional programs	2.98
Student support in the use of lab facilities	2.98
Demonstration of purchased software	2.86
Installation and repair of microcomputers	2.38

Figure 44. Faculty Support Area Needs

This data suggests that support is needed in all areas that were surveyed with emphasis on information management and the need for written instructions on computer use. Information Management includes the gathering, processing and distribution of information which allows faculty and students to make effective use of computers. Types of information include policies and procedures on computer use, computer instructions, information on available software and hardware resources and information used in the planning process.

At this point it is not possible to quantitively predict the additional number of faculty who will use computers over the next three years. Consequently it is difficult to predict how many additional full-time positions will be needed to support faculty in the use of computers. Current levels of support appear to be adequate.

Recommendations - Faculty

The following recommendations define the levels of support needed to meet the faculty increase in computer use and still provide an adequate level of training.

- **Establish a computing support and information network.**

  The support that is needed by faculty will increase as the use of computers increases. There will be an increase in the number of individuals in need of service as well as an increase in the kinds of services that are required. Because of the rapid advances that are now taking place in computer technology and the explosion in available computer software, computer support is expected to become more difficult. In order to provide an adequate level of computer support for the next three years, a computer knowledge network needs to be established through which computer expertise can be exchanged.

  This network will:

  - Consist of support staff as well as faculty who have achieved a level of expertise which is of value to other areas of the college.

  - Provide for communication between the area or individual in need of assistance and the individual most knowledgeable about the topic.

  - Bring together areas of support that are now distributed throughout the college.

- Serve as a storage area and conduit for information which is also considered a part of the college's computing knowledge resource.

The growth of computing knowledge and information resources at the college will depend on the first three of the following faculty support recommendations.

- **Continue staff development and computer training.**

Depending on their level of expertise, faculty should continue to increase their knowledge of computers. Below is a hierarchy of the different levels of computer literacy.

- Knowledge of the operation and parts of the computer. Exposure to general-purpose applications.
- Use of computers regularly for office, preparation and professional use.
- Use of computers in existing currriculum.
- Reassessment of curricular goals and investigation of new technologies.

The last two levels have the greatest impact on the use of computers in instruction. The last two levels cannot be attained until the first two levels of literacy are achieved. It is recommended that staff development and computer training activities continue to promote computer literacy at the college. Faculty need to be encouraged to attend these workshops. Faculty at the fourth level add to the colleges computer knowledge resource. This knowledge base is also increased by funding trips by faculty to other colleges and computer hardware and software vendors.

- **Organize and distribute documentation.**

It is essential to provide high quality documents which aid faculty in using computer resources and provide information that help in the investigation of new applications. This includes an index of computer hardware, software and computer expertise; lists of manuals and documents and where to find them; information about existing systems and applications; information about software resources; minutes of board and committee meetings and new projects that are currently in progress. It is recommended that a faculty guide to the college's computing resources be compiled and distributed.

- **Provide consulting on computer-related issues.**

All computer support areas, including Computer Services, Instructional Design, the Learning Resource Center, the Regional Centers and the Instructional Divisions should continue to help faculty in the investigation of new applications, problems with hardware and software and the integration of computer use into class instruction. Individuals who support the larger computer systems need to make instructors aware of the potential use of these systems.

- **Provide faculty with programming support.**

Faculty who want to use computers in instruction, but do not want to develop the applications themselves can define the specifications to programming staff who are responsible for writing the programs. Because of the success of this approach in the development of the Sabre system and Fitness Lab program, it is recommended that programming support be increased and provided to all faculty.

Action Plans and Financial Considerations

This section identifies each recommendation from the academic computing section and defines the estimated costs and time frame for acquisition and implementation. The following table shows each major computing area with the items that need to be acquired over the next five years. The tables define the capital cost and the operating budget cost. The operating budget cost is usually the maintenance amount needed to support the hardware/software. Also included is an estimated time

frame. This identifies when the item should be acquired, installation date and estimated production date.

ACADEMIC COMPUTING

Item	*Budget Estimate* Capital	Operating	*Time Frame* Acquire	Installation	Production
Hardware Needs					
Lab Resources					
(16) IBM PC	$48,000	$4,800	Jan 88	April 88	Aug 88
(17) IBM PC	51,000	5,100	Aug 88	Nov 88	Jan 89
(18) IBM PC	54,000	5,400	Aug 89	Nov 89	Jan 90
(5) Plato	2,500	250	Aug 89	Nov 89	Jan 90
(1) Multiplexer	5,000	500	Jan 88	April 88	Aug 88
(4) Intergraph	65,000	6,500	Jan 88	April 88	Aug 88
(4) Intergraph	65,000	6,500	Aug 88	Nov 88	Jan 89
(3) Intergraph	50,000	5,000	Aug 89	Nov 89	Jan 90
(5) MacIntosh	10,000	1,000	Jan 88	April 88	Aug 88
(5) MacIntosh	10,000	1,000	Aug 88	Nov 88	Jan 89
(5) MacIntosh	10,000	1,000	Aug 89	Nov 89	Jan 90
(10) Unix	10,000	1,000	Aug 87	Nov 87	Jan 88
(6) Unix	6,000	600	Jan 88	April 88	Aug 88
(6) Unix	6,000	600	Aug 88	Nov 88	Jan 89
(6) Unix	6,000	600	Aug 89	Nov 89	Jan 90
(3) Wang	3,000	300	Aug 89	Nov 89	Jan 90
(10) Printers	5,000	500	Jan 88	April 88	Aug 88
(10) Printers	5,000	500	Aug 88	Nov 88	Jan 89
(10) Printers	5,000	500	Aug 89	Nov 89	Jan 90
Total	$416,500	$41,650			
Microprocessing Center					
(1) Network Servers	50,000	5,000	Jan 88	April 88	Aug 88
(2) Network Servers	100,000	10,000	Aug 88	Nov 88	Jan 89
(1) Power Backup	50,000	1,000	Aug 88	Nov 88	Nov 88
Total	$200,000	$16,000			
Outside Access					
(3) IBM PC-Loan	$6,000	$600	Aug 87	Oct 87	Nov 87
(2) IBM PC-Loan	4,000	400	Aug 89	Sept 89	Nov 89
(1) 7171 Expansion	5,000	500	Aug 87	Oct 87	Nov 87
(5) Dialup Ports	5,000	1,000	Aug 87	Oct87	Nov 87
(5) Dialup Ports	5,000	1,000	Aug 88	Oct 88	Nov 88
(5) Dialup Ports	5,000	1,000	Aug 89	Oct 89	Nov 89
(2) Projection Systems	10,000	1,000	Aug 87	Oct 87	Nov 87
Total	$40,000	$5,500			

Figure 45. Academic Computing Financial Considerations (Part 1 of 2)

ACADEMIC COMPUTING (Continued)

Item	*Budget Estimate* *Capital*	*Operating*	*Time Frame* *Acquire*	*Installation*	*Production*
Regional Centers					
Hinsdale-IBM PC's	$29,500	$2,900	Aug 87	Oct 87	Jan 88
Davea-IBM PC's	30,000	3,000	Aug 88	Oct 88	Jan 89
Total	$59,500	$5,900			
Faculty Access-Faculty Suites					
(10) PC's	$20,000	$2,000	Aug 87	Oct 87	Nov 87
(10) PC's	20,000	2,000	Aug 88	Oct 88	Nov 88
(10) PC's	20,000	2,000	Aug 89	Oct 89	Nov 89
Total	$60,000	$6,000			
Faculty Work Area					
Personal Computers	$6,000	$600	Jan 88	April 88	Aug 88
Faculty Research		$10,000	Jan 88	April 88	Aug 88
Software Needs					
Faculty Development	0	$5,000	Jan 88		
Public Domain Software	0	2,000	Aug 87		
Central Software	0	30,000	Aug 87		
Labs-Software	36,000		Aug 87		
	$36,000	$37,000			
Support Needs					
Staff Development					
Support Staff		$30,000	Jul 88		
		$30,000			
Lab Aides		$5,000	Aug 88		
Total	$818,000	$157,650			

Figure 46. Academic Computing Financial Considerations (Part 2 of 2)

The total amount needed for academic computing is $818,000 of capital funds and an increase of $157,650 in the operating budget. See the final section of the plan for a breakdown by fiscal year.

ADMINISTRATIVE COMPUTING

Overview

Administrative computing includes all the information processing services which provide the college management with the data necessary to make decisions, record data, and carry out the day-to-day operations. The major administrative functions/applications include payroll, personnel, general ledger, accounts payable, accounts receivable, purchasing, student registration and records, financial aid, inventory, word processing, and management information system.

The complexity of the operation of the College of DuPage today requires automation to meet the internal and external reporting needs and the day-to-day operational needs. Most applications today are online. This provides users with immediate access to data stored on the computer for query or for reporting.

Several issues pertaining to administrative computing must be addressed to provide an acceptable level of service and support:

- Provide users adequate online response time, i.e. quick access to data
- Provide users with adequate disk space to store their data now and for the future
- Provide users with a security system to maintain the integrity of the data
- Provide users applications that are flexible and easy to maintain and modify
- Provide users applications that are accurate
- Provide users the tools to access their data and generate their own reports and analysis
- Provide users download and upload capabilities to allow data stored in departmental computers to communicate with host computers
- Provide users consulting support for their application
- Provide users with training on how to use an application
- Provide users with user documentation for ease of use
- Provide users with flexible operational hours
- Provide technical expertise to evaluate current and future applications

There are many other issues that affect computing on campus. In the following sections we will address the administrative computing requirements of the college. We will evaluate the survey data as it relates to the computing resources, and will make recommendations as appropriate.

Administrative computing needs are divided into software, hardware, and support. Software includes major administrative applications and end user applications. All major applications are supported by Computer Services and are usually run on a mainframe or minicomputer. The end user applications deal with "tools" that are used by end users to perform their jobs. This would include microcomputer-based applications and decision support systems.

The following section evaluates each administrative application that currently exists, any enhancements, replacements necessary and itemizes new applications that need to be acquired and/or developed in-house.

Software Needs

Administrative Software Needs

Major administrative software applications at the college include:

- General Ledger System (GLS)
- Human Resources - Payroll and Personnel System (PPS)
- Financial Aid System (CDAS/FA)
- Student Billing and Receivables System (CDAS/BR)
- Student Records System (CDAS/SR)
- Capital Assets System (CAS)
- Management Information System (MIS)
- CLSI Library System
- Response System Variable Prescription (RSVP)
- Office Automation

The following sections discuss current problems and concerns, and make general recommendations for each of these applications.

General Ledger System (GLS)

Description: The General Ledger System (GLS) is an independent information system managing purchase orders, journals, cash receipts, and disbursements by vendor and chart of accounts. It was originally designed to handle accounting, budgeting, cost allocation, and financial reporting functions for the college. This is an old system which has been in production since 1976.

The entire online portion of the system is written in a specially edited Assembler language that is extremely difficult to modify. Consequently no modifications have been made to the online portion of the system since 1979. The batch processing section is written in COBOL and has been modified periodically to meet users reporting needs.

Users: The Business Office is the principal user of this system although the financial and budget reports may be of use to all administrative areas of the institution.

Category: The General Ledger System is in need of replacement based on its current structure and the amount of changes needed to modernize it to acceptable standards.

Concerns/Problems

- A general ledger system should handle all of an organization's accounting, budgeting, cost allocation and financial reporting functions. It should provide online data entry, journal balancing and error correction capabilities.
- Flexible user defined account structures for reporting purposes should be available. Comparisons between actual and budgeted amounts should be readily available and easily generated.

- A flexible reporting structure including *ad hoc* and user defined special reports should be available.
- The accounts payable function should be a comprehensive online application supporting the accounting, controlling and reporting activities necessary for the institution. Online interactive features should afford quick checking of account status.
- The most desirable organization of the General Accounting System would intergrate general ledger, accounts payable, and purchasing functions to allow a coupling of the purchase order, invoicing, receiving and inspection phases of a general financial accounting application.
- Several needs have been specifically identified by users of the GLS/General Accounting Application. These needs are listed below and should be incorporated within a new financial application System.

  - An online purchase order module is needed to track purchase orders
  - An online bidder's list is requested to simplify the bidding process
  - Online storage of bid specifications are needed for an accurate, more efficient bid process
  - The warehouse receiving function should be automated to improve the purchasing function
  - A cash management system is needed to improve fiscal controls
  - A more flexible and responsive reporting system is needed to better manage and audit financial operations

Growth Requirements: We project that the growth of the application for accounting and purchasing to be as follows:

Purchase Orders	An annual increase of five percent for the next three years
Vendor File	An annual increase of 10 percent for the next three years
Accounts	An increase of 20 percent in the number of accounts in fiscal 1988 followed by a steady state
Journal Entries/Cash Receipts	A five percent increase is anticipated for the next three years
Invoices	A five percent increase for the next three years is anticipated

Recommendation: Based on the age of the existing GLS system, its lack of sophistication in reporting and the purchasing function, and the extreme difficulty in modifying the system because of its coding structure, we recommend the system be replaced.

We believe a system should be purchased based on IDMS/R data base technology. We believe a new integrated online General Ledger, Accounts Payable, Purchasing System is the best method for improving the Financial Accounting/Purchasing function of the institution.

Human Resources - Payroll and Personnel System (PPS)

Description: The Human Resources System is a new IDMS/R based application providing for the full payroll function and reporting as well as maintaining a personnel data base containing employment, history, demographic, benefit and personal information. Salary, time reporting, job status, employee history, personal data and benefit data are updated and stored in integrated data bases under IDMS/R.

This system was purchased from Integral System in late 1985 and is scheduled for full implementation during 1987. This comprehensive data base product is undergoing modifications to tailor it to our hardware and user processing requirements.

The system provides online access to this information for inquiry and update purposes. An online report generator called Online Query (OLQ) is available to produce custom reporting. Normal reporting will be done by an IDMS/R feature known as CULPRIT, which allows for report additions and changes to be made with relative ease.

Users: Human Resources and the Business Office are the principal users of the system, including the responsibilities for data entry and updating.

Category: The Human Resource System is in implementation stage. Once fully operational, it will require ongoing program maintenance to apply tax, benefit and other regulatory and institutional modifications. Because of its modern IDMS/R design, it should be operational for many years.

Concerns/Problems: The Human Resource System is written using the facilities of the IDMS/R data base. This is a state of the art data base management application system that will provide up to date online personnel and payroll information for all full-time and part-time faculty and staff. The reporting capabilities of this system are flexible and more timely than the system it replaces.

The greatest immediate concern relating to this system is the relative lack of Computer Services staff experience in data base management system IDMS/R. As experience working with both the package and IDMS/R is gained by Computer Services, this concern should be eliminated. It should be understood that all major mainframe applications will be developed in IDMS/R. The Human Resources System is the first application to use this technology at the institution, and the experienced gained with the data base management system will be applicable to other IDMS/R systems.

A short range as well as continuing concern is the need to apply upgrade releases to the IDMS/R package. The vendor, Integral Systems, has announced the availability of major new releases of the product. These provide enhancements to the system including an online history data base as well as reporting, updating and organizational improvements. Approximately one month will be required to effect this upgrade.

Additional continued maintenance will be required to apply tax and statutory changes to the system. It is important that system modification be closely examined concerning their impact on both regular tax and statutory changes as well as vendor release upgrades.

Applicant tracking is not contained in our current system and a need exists to develop or purchase a module that will interface with the personnel data on this sytem.

Position Control is a module acquired with the existing system but is not being implemented currently since the Position Control data base is not integrated with the Employee data base. Interim position control is being considered and will be discussed later.

Growth Requirements: We project the growth of the system as follows:

	Current Records	*FY88*	*FY89*	*FY90*
Human Resource System	5000	5500	6000	6500
Including Applicant Tracking	--	10,000	20,000	20,000

Recommendation: We believe that the acquisition of the Integral System Human Resource System is working out well and will have a successful implementation. We also believe it will serve the institution well for the future. We recommend that annual tax changes be applied via vendor updates rather than coding them in-house. We recommend that the issues relating to Applicant Tracking and Position Control be analyzed further to determine the most effective method of applying these functions within the institution.

Financial Aid System (CDAS/FA)

Description: The Financial Aid System was developed internally to integrate with the student system. The system's main function involves processing financial aid awards including Flat, Illinois State Scholarship Commission, Pell, IVG, and Illinois Guaranteed Loans. Financial Aid application, tracking, verification of enrollment and regulatory reporting are other major functions of this system. In addition, student employment processing is performed on this system.

The system is an online application with batch reporting capabilities. Significant problems had been encountered by the Financial Aid Office prior to recent major contract programming changes. The system is now functioning adequately.

Users: The Financial Aid Office is the principal user of this system with the Business Office requiring some reporting capabilities.

Category: The Financial Aid system is functioning reasonably well. Major change is probably not currently needed although some enhancements described below are needed. This system is viable but in need of continued maintenance and improvement.

Concerns/Problems

- A major problem exists each year that the federal government regulations change, requiring significant support time. Every three to four years, major changes require a two-person full-time effort to make the necessary changes. Major Federal regulation changes have been announced for FY88.
- A major concern of the existing system is a need for updated and improved user documentation. This is especially important since major changes to online screens, calculations and reports have been made.
- A major problem exists relating to the online calculation of aid awarded under certain registration conditions.
- Currently there is an estimated 800 hours of administrative programming time required to completely eliminate the existing backlog of problems and enhancements remaining to be completed for the Financial Aid system.
- Enhancements requested include the online generation of approximately 1000 award letters annually and the generation of 5000 Financial Aid transcripts.

Growth Requirements: We project growth of the Financial Aid System to be as follows:

	Current Records	*FY88*	*FY89*	*FY90*
Master File	31,000	33,800	36,500	39,000

Recommendations: We recommend that the required improvements be made in-house with Computer Services or programming consultants. We believe the major modifications to this system have been successful. This system should provide worthwhile service for several years until the acquistion of a comprehensive integrated student data base system is acquired.

Student Billing and Receivables Systems (CDAS/BR)

Description: This system is a major module in the CDAS online system. It manages all student financial data related to the Student Record System, the Financial Aid System and the General Ledger System. The system maintains the student's account through the payment cycle (cash, financial aid, credit card). In addition the system prints schedules/bills, and maintains history information as well as producing financial reports.

The Billing and Receivables System (CDAS/BR) maintains two major files, the Master Detail file (MDF) and the Subcode file (BRSCF). The MDF file maintains detail billing information on each student while the Subcode file contains information relating to a five digit code identifying various types of transactions allowed.

Users: The principal users of this system are the Business Office, the Financial Aid Office and the Registration Office.

Category: This system needs replacement due to the amount of time and difficulty required to bring it to acceptable processing standards.

Concerns/Problems: A major concern involves the size and architecture of the files used by this system. The MDF file contains 1.2 million records currently and it is becoming increasingly difficult to efficiently process this file.

The system is in need of a redesign to allow for the flexibility and efficiency required. There is a current backlog of 1200 hours of programming hours needed to meet desirable processing standards. Besides the number of hours required, a further difficulty is due to the complex and confusing interaction between the BRS and the other CDAS modules.

Growth Requirement: We project growth of this system for the next three years to be as follows:

	Current Records	*FY88*	*FY89*	*FY90*
Subcode	1,300	1,500	1,700	2,000
Master Detail File	1,200,000	1,236,000	1,273,000	1,300,000

Recommendation: We recommend that the Billing and Receivable System be replaced as part of a major student data system. We believe it would be wasteful to devote the programming hours required to attempt to modernize this system. We believe an integrated IDMS/R data base management system should be acquired combining the current Student Billing and Receivable System, Student Records and Financial Aid System.

Student Records System (CDAS/SR)

Description: This system develops and maintains all data necessary to support student functions. These functional areas include admissions, scheduling, registration, grades, and transcript generation. Information is provided for instructors including courses, classes, and fees involved.

The Student Record System (CDAS/SRS) SRS is responsible for all information pertaining to a student's academic record as well as information concerning all possible course offerings. Eight major files are required to provide this information:

- Student Key File (SKF) - contains demographic data.
- Student Term File (STF) - contains information regarding the student classes taken each quarter.
- Course Inventory File (CIF) - contains information concerning each course the institution has received permission to offer.
- Course Term File (CTF) - contains individual class section information.
- Class Roster File (CRF) - contains a list of all students enrolled in each section of each course within a term.
- Transcript Text File (TTF) - contains information required for production of student transcripts.
- Publishers Comment File (PCF) - contains information concerning individual course requirements or prerequisites.
- Major Code File (MCF) - contains information regarding all major codes and their corresponding state information. It may be used for all programs needing major code information.

Users: The major users of this system are: Records, Registration, Instructional Services, Business Office, Financial Aid.

Category: This is in need of replacement due to its cumbersome file structure, file size and amount of modification required.

Concerns/Problems

- The number and complex nature of the interactions among the files of this system make modifications, enhancements or error corrections extremely difficult. A new system should possess an integrated file structure allowing easier access to data elements that currently reside in separate files.
- This system is in need of a redesign which would be difficult and error prone. Redesign is necessary to incorporate the large number of enhancements, corrections, and modifications pending.
- Security levels are not adequate and are in need of strengthening. This is difficult to accomplish with the current system.
- The Records area is in need of an automated Graduation Audit feature. This is a very complex project to accomplish working within the constraints of the current system.
- The SR System currently has a backlog of 12,000 programming hours to satisfy current user requests.
- A major long term goal is the acquisition of a Student Self-Registration System using voice activation. This is a virtual impossibility within the structure of the current system.
- The registration process needs the flexibility of variable entry/variable exit registration not based on the current fixed quarter system. This feature is needed to accommodate the increasing percentage of courses based on semesters, or on terms less than full quarters.
- Advance multiple quarter registration is regulated by the registration office to accommodate the spring to fall registration process. An eventual goal would be the scheduling and registration for an entire academic year.

- Improved transcript processing including the scheduling of transcript generation is needed.
- More efficient entry of grades from special programs such as independent study is needed. Currently, grades are hardcopied and subsequently, data is entered into the student records system.
- Sophisticated online degree audit and transfer credit evaluation methods are needed.
- An automated recalculation of grades is needed when grade changes occur. Currently this process is done manually, with 20,000 grade changes made each year. This labor-intensive process should be automated.
- The current nine-digit coding structure limits the institution in scheduling courses. For example, the two-digit section code permits only 99 sections to be offered.

Growth Requirements: We project the growth for the SRS files listed below as follows:

	Current Records	*FY88*	*FY89*	*FY90*
Class Roster	8,500,000	8,755,000	9,010,000	9,300,000
Student Term	332,000	336,000	339,000	342,500
Student Key	225,000	236,000	245,700	253,000

Recommendation: We recommend that the Student Record System be replaced. The exisiting amount of programming effort required to update this system is very high. We believe purchasing an integrated Student System is the best choice.

Capital Assets System (CAS)

Description: The Capital Assets System is a replacement for the existing Fixed Assets System. It is designed in IDMS/R data base management system and as such, is the first system developed at the institution. It is scheduled for full implementation in early 1987.

- This system provides for the tracking of all inventory items owned and maintained by the college.
- This system also monitors the financial status, determines the location and holds other data associated with the individual item's account.

Users: The Business Office is the main user of this system although other areas such as Campus Services would benefit from an expanded version of the system.

Category: This system is a replacement system for an existing Fixed Inventory System. It is in an implementation and enhancement stage. Since it is designed under IDMS/R, it should serve the institution for several years.

Concerns/Problems: The system's new development greatly improves the capacity of the older Fixed Asset System. Its original design parameters could be expanded to include more information valuable to other areas of the college relating to the inventory of equipment and other assets.

Growth Requirements: We project the growth of this system as follows:

	Current Number	*FY88*	*FY89*	*FY90*
Inventory Records	23,000	23,700	24,400	25,100

Recommendations: We recommend that this system be enhanced and interfaced with other inventory systems on campus. An example could be incorporating Campus Services equipment and maintenance inventory items.

We believe this system, once fully implemented, will be very useful and will be easily maintained due to its IDMS/R design characteristics.

Management Information System (MIS)

Description: This is a reporting system only at this time. It extracts summary and detail data from the College of DuPage Administrative Systems (CDAS) to provide information required by the Illinois Community College Board regulations. Other functions include providing data required for State and Federal reimbursements and tracking student enrollment trends. The system maintains no permanent files of its own; its sole output consists of a number of MIS6000 and MIS7000 reports.

The MIS system is currently composed of the following component reports:

- MIS6010 Summary of A1 report
- MIS7010 Total Enrollment Characteristics
- MIS 7015 Staffing Profile by Department/Instructors
- SRS 5410 Grade Analysis Report
- Trendbook Historical Summary of College Statistics

Users: The principal users of this system output are all college administrative departments.

Category: This is an existing batch reporting COBOL-based system requiring major enhancements.

The college is in need of an integrated MIS capability that can reveal the underlying relations essential for informed decision making and planning. Current computer programs are limited in scope and address only specific issues. They lack the flexibility to meet diverse information requests without modification.

Concerns/Problems

- The users require many additional reports. Because of the complexity of the extraction logic of this system, the programming required can be significant to effect any changes.
- Scheduling can be a problem due to the large volume of records that must be read.
- The MIS7000 data should be made readily available, perhaps via electronic mail.
- A major analysis of the A-Records is needed for use in a research student flow model.
- An easily accomplished downloading method should be established to allow the Research Office access for personal or Application System (AS) computing use.
- A-Records are requested to be stored on disk for long term access.
- Currently there are 1200 hours of backlog programming hours required for the MIS System.

Growth Requirements: We project the following growth for this system:

	Current Records	*FY88*	*FY89*	*FY90*
MIS A-Records	38,000	47,500	59,000	74,000

NOTE: Currently A-Records are temporary files that are not kept beyond a very short retention cycle. The A-Record is 120 bytes long.

Recommendations: MIS is a recently developed reporting system lacking much flexibility to meet the main users' changing requirements. We recommend that the MIS System be enhanced to meet users' needs, but we believe other alternatives must be investigated to find alternate methods of providing some of the research data produced by the MIS System.

Research and Planning needs specialized software that will provide flexible capabilities to address college information needs in an integrated and prompt manner. Such a system would extract necessary data elements from existing files and be operated through the Research and Planning Office.

CLSI Library System

Description: The CLSI Library System was acquired by the College of DuPage Learning Resource Center in 1980. A turn-key system provided by CLSI, it consists of PDP 11/34 hardware and software written in a language called FLIRT (File Language In Real Access Time).

The system provides a Public Access Catalog, a book Acquisition Module, and a Circulation Control Module.

- Public Access Catalog (PAC) is an online method using touch screen or regular terminals to allow patrons to perform functions normally associated with a traditional card catalog.
- Acquisition Module is a subsystem providing for ordering and follow-up relevant to new books for the LRC. It contains an accounts payable function as well, although this function is not currently being used.
- Circulation Control is a module providing for check-in and check-out activities for LRC materials. The system uses bar coding for transactions.

Users: All individuals needing and using LRC materials with the exception of periodicals, computer equipment and audiovisual equipment, make use of this system. This includes faculty, staff, students and community users.

Category: The CLSI Library System is in need of either major upgrade or replacement for reasons described below.

Concerns/Problems: The system is operating in a reliable fashion at present. All system hardware and software problems, within the design parameters of the system, are taken care of within an acceptable time frame. The major problems with the system, however, relate to the design obsolescence of the current system. Listed below are the major difficulties identified to date.

- The system, acquired seven years ago, uses a DEC PDP 11/34 computer that is becoming inadequate in response time and total number of ports available. A maximum of 40 ports is possible on this system; the LRC is currently using all available ports. Equally limiting is the slowing response time as each additional port is added. Additional ports are needed for off campus and home use.
- The Public Access Catalog (PAC) is not being enhanced by the vendor, CLSI. They are developing a new version, known as PAC2 which would entail a major expense and conversion effort to install. As a result, enhancements to PAC will no longer be made.
- Problems with PAC include: lack of a key word access retrieval method, ineffective and limited Boolian searches, and limited flexibility in accessing information with touch screens. Access to the collection by terminal is very limited and difficult.
- System maintenance costs are high in view of the fact that new development is not taking place. Essentially the system maintenance costs are as high as when the system was undergoing regular enhancements, something that is no longer occurring.

- The Acquisition Module works poorly. It is time consuming, repetitive, and tedious to prepare book orders. Editing and discrepancy do not function well, and as with PAC, relatively few enhancements are being made.

- There are a number of problems with the circulation control functions:

  - When a library card is lost, data pertinent to the existing card cannot be transferred to a new card number.

  - There is a lack of flexibility in producing overdue notices; only two items can be listed on each form, requiring multiple notices to one patron. This is cumbersome and expensive.

  - The screen design logic is inadequate in that there is an inability to move from one procedure to another without repetitive rekeying of data.

  - Fines are not calculated correctly for reserve books and video cassettes, requiring manual intervention.

  - The library fine process is further complicated by the failure of the system to take calendaring into account in computing fines.

- There is no materials booking module for audiovisual equipment. This remains a major problem.

Growth Requirements: We project that the needs of the LRC will experience steady growth in numbers of items in the collection, patron use, and number of terminals needed to meet user needs. An estimated increase of approximately 10 percent annual growth is expected in both material holdings and patron use. These are conservative estimates and should hold true for the next eight to ten years.

Recommendations: We recommend that a major study of alternative library systems including the CLSI PAC II system, be conducted. The LRC management staff feels a fiscal year 1989 implementation is desirable because by that time the existing system will be overburdened to a critical degree.

Continued reliance on CLSI software would involve a hardware upgrade to a PDP 11/84 minicomputer. The software changes to the new Public Access Catalog (PAC2) would require a significant cost and conversion effort. We believe that either upgrading or replacing the current LRC library system is a major undertaking and should be given major design and feasability emphasis, and financial support by and during fiscal 1988.

Response System Variable Prescription (RSVP)

Description: The Response System Variable Prescription (RSVP) is a sophisticated software package for supporting individualized study courses for students. It was originally acquired from Miami Dade Community College and was subsequently heavily modified to run on the Hewlett-Packard 3000 Minicomputer.

This system is written in FORTRAN and System Programming Language (SPL). The data base structure is designed using IMAGE, a relational data base management system. Data is input via a SCANTRON data entry device that machine reads coded forms. Additional information necessary to build and update student records is obtained via Student Record System magnetic tape extracts written in the COBOL Programming Language.

The current major functions of this system are to:

- Generate letters to students in individualized study courses. These letters may include welcome letters, reminder letters, instructor generated letters based on test score results, or letters suggesting review or further study. There are 500 decision rules upon which letters may be constructed. There are a minimum of 3000 students enrolled in these individualized study courses.

- Score and evaluate math placement test for selected mathematics courses.
- Produce a projected total of eight different letters for a population consisting of the entire student body for retention efforts. Currently there are two letters available; a retention letter based on GPA and selected poor performance factors, and a welcome letter for each new student. Eventually a projected total of eight letters will be generated for retention purposes.

The Hewlett-Packard based system using the IMAGE data base is currently being marketed by Miami-Dade Community College for the College of DuPage. Waubonsee Community College is the first institution to have purchased this version of RSVP.

Category: The RSVP is in need of major revision in either software, hardware or both for reasons discussed below.

Concerns/Problems: It should be understood that RSVP is a sophisticated and powerful tool for the administration of learning. Considerable time and effort have been expended in modifying RSVP to operate on Hewlett-Packard equipment. Unfortunately, the reliance on the Hewlett-Packard HP 3000 Minicomputer places the system in a vulnerable and limited position.

The HP 3000 is an aging computer with diminished support available as well as increasing maintenance costs. RSVP is the only application running on this equipment. The processing speed and capability of the HP 3000 is limiting current and future development of application that can use RSVP. Simply stated, the options available to solve this problem are:

- Continue using the current system without major modification until either hardware support is withdrawn or becomes prohibitively expensive, or future development is restricted due to limited hardware capacity.
- Purchase a newer model Hewlett-Packard Minicomputer and modify existing software to run on it.
- Convert the RSVP system from Hewlett-Packard IMAGE to an IBM mainframe compatible system inhouse. This would require an estimated three man-years effort at an estimated cost of $400,000.
- Purchase an IBM compatible version of RSVP running under SQL or a similar relational data base and operate RSVP on the IBM mainframe.

In addition to the more general question of the direction of RSVP as an application, several smaller more immediate concerns are listed below:

- A more flexible, quicker method of extracting student information from the Student Record System is needed. Currently a large amount of time is spent formatting and trouble shooting tape extracts.
- A higher speed printer is needed for system printing. The speed and turnaround time of the equipment currently available is not adequate.
- The existing HP based RSVP environment makes changing screens and data items difficult and time consuming. There are utilities available that can ease these modification difficulties that should be investigated.

Growth Requirements: We project the growth of the RSVP System to increase approximately 10 percent per year for the current individualized instruction courses. More significant is the projected implementation of up to eight retention letters, some of which will be sent to each registered student. The exact projected number of letters created for retention purposes is not available but could easily exceed 50,000 letters per academic year.

	Current	*FY88*	*FY89*	*FY90*
Individualized Study Students Served	3000	3300	3630	4000

Recommendations: Based on the age of the Hewlett-Packard 3000 system and the importance of the functions served by the RSVP applications, we recommend that a comprehensive study be undertaken to determine the feasibility of either purchasing a conversion of RSVP from Hewlett Packard to IBM, or upgrading the Hewlett-Packard hardware to meet the current and future needs of the institution.

Office Automation

Description: Development in computers, telephone systems and related office products are rapidly affecting the manner in which the administrative process is accomplished. Office activities supported through technology are usually referred to as *office automation*. Sometimes this term restricts one's vision of the total effect that technology has on an institution. Too often, office automation is seen as the implementation of word processing systems used primarily by secretarial and clerical staff although actual experience has shown that executive productivity increases significantly when the full office automation concept is implemented.

We must consider the concept of office automation for management support with the realization that *management* is carried out by a team composed of the executive/administrator, the secretary, and staff in the organization. When viewing administrative activities in this broad sense, one begins to realize the extensive and positive impact that office automation support can provide to the management process. Automation affects the manner in which administrators interact with one another and with their staff and the way instructors can interact with students.

Office automation provides support in four major areas: decision support, calendar management, electronic mail, and word processing.

- Decision support provides staff the ability to use data for analysis and decision making. The decision support is currently provided through IBM-AS, Application System product. The capability to transfer data from the host or mainframe computer to microcomputers is needed. This allows staff to create and use personal data bases on their microcomputers for analysis and reporting.

- Calendar management provides the ability to schedule individuals and related resources such as meeting rooms in an efficient manner. This includes the management of the administrator's personal business schedule. The ability for an individual to examine several business schedules, to arrange meetings to schedule support resources such as room reservations and audiovisual support items all improve the use of time and institutional resources.

- Electronic mail provides the ability to transfer documents and messages to any user on the system. This includes proposals, memorandums, board policy and procedures, and other material among staff, administrators, faculty, and students, both on and off campus.

- Word processing provides the ability to prepare, format, print, store and retrieve documents electronically. Word processing in the use of automated resources to prepare, edit, and print institutional correspondence. Sophisticated microcomputer based and mainframe based software is available to improve the speed, ease and accuracy of this function as well as produce a near type set quality product.

User: All administrative areas as well as a large percentage of the academic community are potential users of the integrated office automation system.

Category: The office automation project is in existence in Computer Services, the President's administrative area, and to a lesser extent in most administrative and academic areas of the institution. It is in need of full and orderly implementation.

Concerns/Problems: The basis of any integrated office automation system is the existence of data in an automated format created through word processing or other decision support software combined with a communications network linking administrators and other staff electronically. The major concerns to be addressed to incorporate a fully functioning office automation systems are listed below:

- All computer equipment and computer software is not compatible. The institution has several different computer systems, some of which are not fully compatible. We have Harris-Lanier, Apple, IBM, and Wang OAS System microcomputers in use at the institution. Some of this equipment, notably Harris-Lanier and Apple, do not communicate very well with the IBM 4381 mainframe.

- Besides establishing hardware compatibility, the institution needs a communication standard throughout to provide connectivity among the compatible hardware. This communication standard will allow documents created on one system to be transferred and shared on other systems within the college.

- Training traditional office staff and managerial/administrative personnel to fully use and benefit from an integrated office automation system is a task requiring a significant amount of time and effort. Computer Services, if it is to provide responsive and thorough assistance to current and proposed office automation users, needs additional staffing combined with increased specialized expertise to be able to select, train, and administer office automation.

Recommendations: We suggest the following to fully implement a sound office automation strategy:

- Incompatible equipment should be replaced with equipment conforming to the computer industry Document Interchange Architecture/Document Content Architecture Standard (DIA/DCA).

- Computer Services should increase staffing to include at least one Office Automation Specialist/Trainer to provide consulting, training and to assist in the implementation of office automation component.

- Distributed printing capacity should be developed by adding additional IBM 3812 page printers to several administrative areas of the college. These high-quality graphics capable printers will enhance the quality of printed output significantly.

- A standardized product for intra-institution communication such as IBM Professional Office System (PROFS) should be acquired and implemented.

New Applications

Below is a list of new application needs voiced by various adminstrators at the college. This list is not exhaustive, but illustrates the magnitude of computer related applications that could be developed in-house using IDMS/R, IBM-AS, or microcomputer products. Alternatively, they could be purchased and implemented as mainframe, microcomputer, or networked microcomputer packages. The following list includes the area requesting the application, the type of application requested, and comments based on a preliminary analysis by Computer Services to determine whether the best solution would be IBM 4381 IDMS/R, IBM-AS, or a microcomputer package. Each of these items requires further analysis and the assignment of an overall priority.

Area	*Type of Application*	*Comments*
Auditor	Data Sampling System	
Business and Services	Automated Assignment Sheets Part-Time Instructor Evaluation	
Central Campus Counseling	Degree Audit System	Purchase - Mainframe
Health and Special Services	Visit Log Automated Recording System	Microcomputer Package, Purchase
Student Activities	Alumni Tracking Target Marketing Automated Record Keeping Event Acheduling	All Microcomputer Purchased or Developed Packages
Humanities-Liberal Arts	Equipment Transfer System Director Sheets Requisition Tracking System	
Instruction-Central Campus	Access Part-Time Staff Data Prerequisite Registration Produce Catalog Locally	
Provost of Central Campus	Job Placement System	Microcomputer Package, Purchase
Financial Aid	Document Tracking/Federal Reporting requirements, Award Letters	Microcomputer Package, Purchase
Learning Resource Center	Media Checkout, Scheduling System (A-V) CLSI Enhanced Version Or Replacement	Microcomputer Package, Purchase Mainframe, Purchase
Academic Alternatives	Enrollment Records Budget Summaries Assignment Sheets for Part-Time Staff	Microcomputer Packages-Purchase (With Download Capabilities)
Media Productions	Publication Log Job Assignment Mailing List (E-Z Mail Replacement)	Microcomputer Package, Purchase Mainframe-Developed in-house
Business and Professional Institute	Drop/Add Notices - Off-Campus Student Evaluations Open Campus Mailing List	Microcomputer Package, Purchase
Regional Centers	Analyze Part-Time Instructors Applicant Tracking (Instructors)	Micrcomputer Package-Purchase
Business Office	Mainframe Spreadsheet Cash Management System	Purchase Package Mainframe Based
Human Resources	Position Control Applicant Tracking Automated Assignment Sheets Fringe Benefit Job Description File	Purchase - Mainframe Purchase - Mainframe Develop - Mainframe Develop - Mainframe
Purchasing	Vehicle Tracking System Bidders List Bid Specifications Automated Ordering/PO/ Requisition System Inventory Control System	IBM-AS Mainframe-Development

Figure 47. New Application Needs for the Institution

Application Development

The development of software applications is a major consideration in administrative computing. There are two approaches to software development. One is to design and program the applications internally using college staff members. The other approach is to purchase an external package which meets the basic institutional needs. In the case of externally purchased software, modifications may be accomplished either internally or through contracting a consultant.

In the past most administrative software applications were developed in-house. Although the current student registration system was purchased it was modified by 85 percent. The purpose of purchasing a system externally is to allow the vendor to support the application by providing maintenance support.

Last year we purchased a data base management system from Cullinet - IDMS/R. The DBMS provided a future design mechanism to last the college for 10-15 years. When we purchased IDMS/R, we decided to either purchase applications that use the data base or develop the applications in-house using data base with an application development language. We are currently completing a Human Resource System which includes a personnel application that is in production and the payroll application which is scheduled for production in June 1987.

Recommendations

The following recommendations set a direction for future development of administrative applications:

- **Purchase major administrative applications to run under the IDMS/R data base.**

  We are recommending the following large major administrative applications be purchased externally from a vendor to run under the IDMS/R data base. This assumes that 80 percent of the institutional needs can be provided by a package.

  Business System - This includes a replacement general ledger, accounts payable, accounts receivable, and purchasing.

  Student System - This includes a replacement student registration and records, financial aid, and billing. This will also provide a new degree audit application.

  Voice Response System - This allows students to register via touch tone telephone without human interface.

  Management Information System - This provides a system that can generate management information for deans and directors for planning.

  Career Planning - This provides a system for the career office to work with students on planning.

- **Provide office automation throughout the institution.**

  Set up a project using the IBM mainframe as the center for document distribution. This system would include electronic mail, calendaring, conferencing and scheduling. This would be provided in two phases. Phase I would be a pilot project of IBM access users only. Phase II would incorporate Wang and Lanier document transfer into the system.

- **Upgrade the library system.**

  Upgrade the present LCSI system with its revised system or replace with a totally new library system that would provide the needed features and modules.

  Provide necessary upgrades or a suitable replacement for the CLSI catalog and acquire a new serial/acquisition program.

- **Replace the current RSVP system.**
- **Determine the feasibility of retaining the HP 3000 for RSVP by upgrading the HP or purchase a replacement RSVP package for the IBM.**
- **All new medium system applications are to be developed inhouse under IDMS/R data base or IBM AS application system using existing staff.**
- **Convert all existing medium system applications to IDMS/R or IBM AS using existing staff.**
- **All small applications should be developed with IBM AS or purchased to run on a microcomputer.**

Refer to the recommendation and financial consideration section for any recommendations that have associated costs and estimated dates for acquisition and implementation.

End User Software Needs

There are several administrative computing functions that are not provided through the administrative software applications. Administrative computing is also provided through end user software applications.

End user computing capabilities were first established at the College of DuPage in Fall, 1985. This was implemented as part of an approach to enable the data processing function to begin to tackle the 'application backlog' problem. We had an administrative application backlog of about five years and an invisible backlog of unsatisfied user requests that represent at least two to three years of work.

The concept of end user computing was seen as a significant opportunity for reducing this backlog. The result, from a users viewpoint, was potentially a substantial increase in user satisfaction and productivity. It gave the user more control instead of relying just on Computer Services for support.

There were three basic ingredients in providing an end user support environment.

- Consulting and technical support
- Data extracts
- Tools for accessing the data

We first had to set up a support group within Computer Services to provide the consulting and technical support. We set up a new department called Information Support Services to provide training, documentation, personal computing support and end user consulting.

Some of the tools for end user computing were purchased. We purchased a decision support system called Application System from IBM to provide end users graphics, data management, project management, reporting, and statistical analysis.

The last area we are currently working on is the data extraction. Data extraction provides data from the IBM mainframe data base to be supplied/transferred to the Application System. This will give the end users the capabilities of graphics, data management, reporting, and statistical analysis on production data. This should be provided by July 1, 1987.

The following figure shows a list of computer function needs that were identified by the user department survey.

DEPARTMENTAL COMPUTER FUNCTIONS NEEDED

DEPARTMENTS	*FUNCTIONS** 1	2	3	4	5	6	7	8	9
PRESIDENTS									
Office of President		X							
Auditor	X				X	X	X		
CENTRAL CAMPUS									
Office of Provost	X	X	X	X			X		
Automated Office Instruction	X	X	X	X	X		X		
Humanities & Liberal Arts	X	X	X	X	X	X	X	X	X
Social & Behavioral Sciences	X	X	X	X	X	X	X		X
Natural Sciences	X	X	X	X	X	X	X		X
Occupational & Vocational Education	X	X	X	X	X	X	X		X
Business & Services	X	X	X	X	X		X		X
Student Affairs	X	X	X	X			X	X	
Learning Resource Center	X	X	X	X	X	X	X	X	X
OPEN CAMPUS									
Office of Provost		X							
Academic Alternatives	X	X	X			X	X		
Business & Professional Institute	X	X	X	X	X	X	X	X	X
Regional Center - Southwest		X	X	X	X				
Regional Center - East	X	X	X		X	X	X		
Regional Center - North	X	X		X					X
Community Education	X	X	X	X			X	X	X
ADMINISTRATIVE AFFAIRS									
Office of Vice President		X							
Campus Services	X	X				X		X	
Auxiliary Enterprises	X	X	X	X		X			
Financial Affairs	X	X	X			X	X		
Human Resources	X	X	X		X	X	X		
Purchasing		X	X	X		X	X		
Public Safety	X	X			X				
PLANNING & INFORMATION									
Office of Vice President	X								
Computer Services	X	X	X	X	X	X	X	X	X
Admissions, Registration & Records		X	X	X		X			
Research & Planning	X	X	X	X	X	X	X	X	X
EXTERNAL AFFAIRS									
Office of Vice President									
Public Information/Media Production	X		X	X		X	X	X	
Development			X		X	X	X	X	
Campus & Community Events							X	X	

*1-Graphics
2-Electronic Mail
3-Text Management
4-High Quality Printer
5-Statistical Analysis
6-Data Management
7-Report Writing
8-Project Management
9-Download PC

Figure 48. Computer Function Needs by User Department

The following is a graphics representation of percentage breakdown of each functional need. The bar graph shows significant needs in all areas with electronic mail requested by almost all departments.

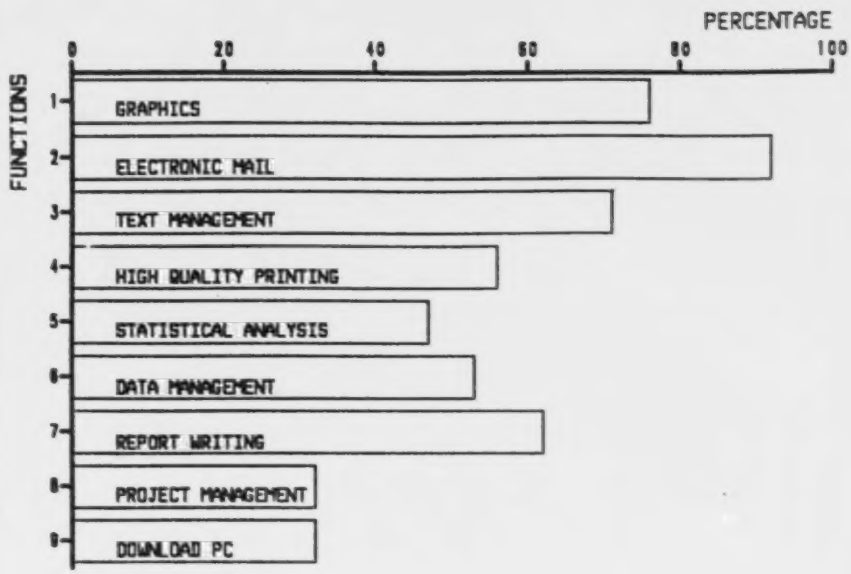

Figure 49. Computing Function Needs of Users

Graphics

Departments requested that graphics be provided to allow for generation of histograms, pie charts, line and area graphs for use in reporting and presentations. The users want access to the information stored on the mainframe to generate the graphs. Seventy-six percent of the departments need graphics capabilities.

Studies indicate an improved comprehension ability when viewing information presented graphically versus textually or numerically. Improved graphics packages allow the user to produce sophisticated graphics without being either artists or computer experts. A wide variety of graphic modes are available; AS, for example, allows eight different graphic types to be created with variations in color, style and size possible.

With the improvements in graphic software, both mainframe and microcomputer-based, it is important to provide consulting to user areas to select appropriate and economical solutions to users graphics needs and wants. Closely related is the need to select proper hardware to input and output graphic materials such as digitizers and light pens (for input); and plotters, printers, and graphic color displays (for output). Computer Services has and will continue to research and suggest solutions to solve users' graphics needs.

Because the mainframe already has some graphics capability, we need to provide the user with a terminal that can display the graphs. We have distributed a few graphics terminals around campus, but we need additional terminals in several areas. At least one graphics terminal should be available in each department area for access.

Electronic Mail

Ninety-two percent of the departments requested electronic mail. Electronic mail provides end users the ability to send documents, memos, and letters electronically to staff, faculty, and

administrators for review or final copy. Electronic Mail will provide tremendous time savings for most administrators and supervisory personnel.

Electronic Mail may be the most important application for the administrative or managerial user. It can be used for brief message or large data files and reports. Some major considerations in selecting an appropriate electronic mail system are:

- The system should be easy to use. It should allow relatively inexperienced computer users to fully use the system with a minimum of training and effort.
- The system used should provide a summary of your mail when you log on your microcomputer or CRT, allowing you to read, file, discard, or reply to messages.
- The system should have a flexible filing method, preferably allowing messages to be retrieved by subject, keyword, author date, or other selection criteria.
- Most importantly, the system should have the flexibility and connectivity to allow all key individuals access to the electronic mail system. This implies that the various types of hardware used (such as microcomputers, terminals, and minicomputer terminals) are able to transmit and receive information on the electronic mail system selected.

Text Management

Text management provides word processing and document storage, archival and retreival. Most departments do have word processing cabilities.

The support needs in this area involve training and developing text management procedures and standards as well as setting direction in the selection and purchase of new text management hardware and software.

- Hardware Options - Text management and word processing can be implemented in several ways. Dedicated word processing equipment such as the Harris-Lanier and Wang systems in operation at the college are becoming less attractive alternatives for most organizations due to their limited capacity and cost. Standalone microcomputers are useful but result in limited communication among areas and require duplication of expensive equipment such as fixed disk storage and printers. Minicomputer systems and Local Area Networks (LAN's) are alternative, but present administrative and technical difficulties that must be dealt with. Finally, mainframe based text processing and file management are possible thru the mainframe, although the software available may be more powerful and complex than most text management functions require.
- A large number of microcomputer-based word processing packages of varying complexity and flexibility are available. Computer Services is attempting to set standards for text management to reduce the number of software packages in use. Our basic standard includes IBM compatible software conforming to the Document Content Architecture - Document Interchange Architecture (DCA/DIA) standards to promote the transferability of documents between systems, including uploading to the 4381 mainframe.

Computer Services has and will continue to support selected use of the 4381 VM-based text management system called Document Composition Facility (DCF) or SCRIPT for unique projects that would benefit from its powerful file managment and formatting capabilities. The *Learning Resource Center Video and Film Catalog* was created using this method.

High Quality Printer

Fifty-six percent of the departments have a need for a high quality printer. The printing capability is needed for graphics and word processing. The use of laser technology is the trend for printing.

The relatively recent advent of laser technology may revolutionize in-house printing. High out-of-house publishing costs may be cut in half in many organizations simply by linking text management systems (such as our current system SCRIPT) to high quality laser printers (such as

the IBM 3812) for in-house production of everything from memos and forms, to catalogs and quarterlies. Rather than lowering standards for printed material by producing it in-house, the trend is to *raise* standards for *all* printed material which can now achieve a near typeset quality. Because printed material has such a tremendous impact on the image of the college, we feel that the importance of high quality printers cannot be overstated.

Desktop publishing technology is necessitating a new view of the entire process of institutional publishing. Traditionally responsibility for the planning, design, artwork, layout, keying, and printing of printed media was assigned to one area; the client was assumed to have no expertise and was allowed no control over the process.

New technology including microcomputer hardware and software, mainframe computer software, such as DCF/SCRIPT and near typeset quality laser technology printers have created the opportunity for the non-professional publisher to produce very high quality documents independently.

Currently two high quality laser-like IBM 3812 page printers are in operation at the college. They are located in Computer Services and the President's administrative area and are used for high quality text and graphics production. These printers produce near typeset quality textual output as well as high quality black and white graphics. It is anticipated that additional decentralized, shared 3812 page printers will be acquired in the next few years to provide this print quality institution-wide. Concurrent arrangements must also be made to provide end-user training in utilizing the new in-house publishing technologies.

Other high quality printing is available from selected letter quality graphics printers attached to IBM microcomputers located on campus. These are lower speed, less durable models than the 3812 described above, but are acceptable for correspondence quality output for individual microcomputers.

In order to provide adequate, easy access to high quality printer capabilities, we need to distribute the printing among the departments. Over the next several years we should distribute six printers directly to the departments.

Statistical Analysis

Forty-seven percent of the departments requested statistical analysis capabilities. Statistics allow for trend and time series analysis, averages, mean, mode, media, and summary cost analysis.

Statisitical analysis is available on the 4381 mainframe via two sources:

- Statistical Package for the Social Sciences (SPSS) is a sophisticated tool used by the Institutional Research and Planning area for developing institutional statistical reporting and trend analysis.
- Application System (AS) has a statistical module allowing simple to complex analysis of data available to AS. This module requires less specialized knowledge to use and is available to any user.

Data Management

Data management allows for collection and storage of information relating to the user area. With data management you can design your own input screens for data entry and report on the informaton stored. Fifty-three percent of the departments need this capability.

Two major options exist for providing data management functions:

- Application System (AS) has a sophisticated data management module allowing users to create, update, and produce reports from data bases created by AS. This function is relatively easy to learn and has been used in several applications developed by and for administrative users. Examples include an Aged Receivables system, Human Resources Benefits subsystem, and a Unit Cost Analysis subsystem.

- Microcomputer-based data management systems exist. Simple structure can be accomodated using products such as Lotus 1-2-3, more elaborate data bases can be designed and implemented using products such as DBASE III+, the *de facto* industry standard. Computer Services is beginning to provide consulting services on the use of these products as time permits.

Report Writing

Report writing provides the user with reports generated from the data base. This gives the user the ability to summerize, total and compute percentages for reporting. Sixty-two percent of the departments want this capability.

Application System (AS) has a complete reporting module that enables users to design and produce their own reports converstationally at the terminal with a very few English-like commands. These reports can be displayed on the terminal screen and routed to a high quality printer.

IDMS/R, the data base management system recently acquired, has rapid report generating capabilities. Although it's tools, CULPRIT and Online Query (OLQ), are not very user-friendly, they do allow end Online Query users the potential for rapid response to their reporting needs through the assistance of Computer Services staff.

Computer Services will continue to review and evaluate mainframe and micrcomputer-based report generating tools. These tools will enable the user to have much greater control over the nature and timing of their information reporting needs.

Project Management

Project management was requested by thirty two percent of the departments. Project management helps a user plan, monitor, and manage projects.

Download PC

Many departments requested the capability to download information stored on the mainframe to the PC. Currently any data stored on the mainframe cannot be downloaded to a PC. Users must retype information in their PC for reporting or analysis. The download capability is needed to maintain the integrity of the data.

For Graphics, Statistics, Data Management, Report Writing and Project Management functions are currently provided by Computer Services through the Application System (AS) from IBM. A full explaination of the product is provided in the current environment section of this report. Application System was aquired to provide end users with graphics, statistical analysis, data management, report writing, and project management. This gave the end user the tools to "do it yourself" instead of relying on Computer Services for all the support. AS has been installed for one year and use of the system is growing. We have not had the support resources to provide the exposure to AS that is needed in the future.

Recommendations

The following recommendations provide the necessary computing functions requested by the departments.

- **Encourage use of AS.**

  Encourage use of IBM's Applications System (AS) product and its capabilities through services and training sessions.

- **Provide users access to Application System with the proper equipment.**

- Acquire 18 additional graphics terminals to distribute to administrative areas during the next three years.

- Provide central computing support for computer generated graphics from a high speed plotter.

-Upgrade open campus and central campus equipment to provide access to AS.

- **Improve the print quality of reports generated by administrative offices.**

  - Acquire six laser printers to distribute printing to major administrative users. The units would be purchased during the next three years.

  - Replace existing IBM 3287 printers in departments where reports are generated to be distributed outside the college.

- **Provide word processing to the departments on campus requiring the capability.**

- **Provide personal computer software for downloading from the IBM mainframe.**

  Investigate personal computer download software and set up a pilot project to determine the applicability.

- **Provide electronic mail to all departments using the IBM mainframe for the distribution server.**

Support Needs

Computer support is provided by several areas of the college as defined in the current environment section. In the departmental survey we requested users to identify areas of support that needed improvement. These were for basic areas of support that were needed: training, programming, documentation, and consulting. The following figures shows the individual departmental support needs.

DEPARTMENTAL SUPPORT AREA NEEDS

DEPARTMENTS	*SUPPORT AREAS** 1	2	3	4
PRESIDENTS				
Office of President	X			
Auditor	X			
CENTRAL CAMPUS				
Office of Provost	X			
Automated Office	X			
Instruction			X	X
Humanities & Liberal Arts		X		X
Social & Behavioral Sciences				
Natural Sciences				
Occupational & Vocational Education	X			
Business & Services	X			
Student Affairs	X	X	X	X
Learning Resource Center				
OPEN CAMPUS				
Office of Provost	X			
Academic Alternatives	X			
Business & Professional Institute				
Regional Center - Southwest				
Regional Center - East	X			
Regional Center - North	X			
Community Education	X			
ADMINISTRATIVE AFFAIRS				
Office of Vice President	X			
Campus Services	X	X		X
Auxiliary Enterprises	X	X		X
Financial Affairs	X	X	X	X
Human Resources	X	X		X
Purchasing	X		X	
Public Safety				
PLANNING & INFORMATION				
Office of Vice President	X			
Computer Services				
Admissions, Registration & Records	X		X	X
Research & Planning	X	X	X	X
EXTERNAL AFFAIRS				
Office of Vice President	X			
Public Information/Media Production	X	X	X	X
Development	X			
Campus & Community Events	X			

*1-Training 2-Programming 3-Documentation 4-Consulting

Figure 50. Departmental Support Area Needs

The figures below show a precentage breakdown for each support area. Training was requested the most by 94% of the department.

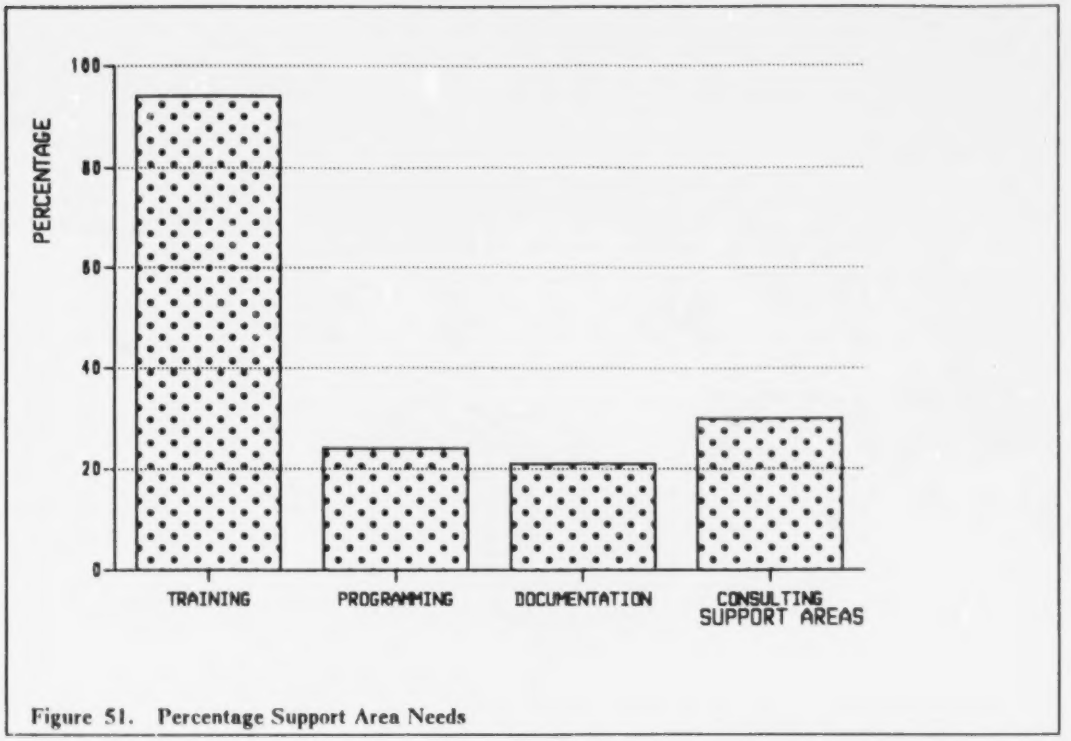

Figure 51. Percentage Support Area Needs

Training

Training was requested by ninety-four percent of the departments. Training is provided by support staff to assist users on how to use computer equipment, how to use computer software, and how to access a computer system. Training can be provided through individual instruction, groups, classes, or video-based education. Individualized training provides the fastest learning curve. Training support is basically provided by Information Support Services. They have about one half of an FTE of current support.

One of the most overlooked areas is computer training. We purchase computer equipment, the equipment is installed and then the user asks, "How do I use it," "What else can I use it for?", "I want to access data stored on the mainframe."

The major areas requiring training are listed below:

Mainframe Computer System

- The IBM 4381 mainframe computer system provides a wealth of information for administrative computer users. Major administrative systems, such as the CDAS system (consisting of Financial Aid, Student Records, Billing and Receivables, the General Ledger system, the new Human Resources and Capital Assets systems as well as others) allow the many current and potential computer users to review, change, update, and analyze data. Users need initial training in how to use a terminal or terminal-emulating device such as a PC; how to access and manipulate data in the various systems; and more generally, what data is available on the computer and how it can be used.

- Other areas requiring training are mainframe-based word processing (SCRIPT), use and access of the CMS-based tools such as electronic mail and the College of DuPage Menu system.

- Application system (AS) is an end user tool designed for use by both relatively non-technical and technical personnel. As increasingly sophisticated applications for this tool are found, significantly more training will be needed.

Microcomputer Systems

- The major use of microcomputers to date at the institution has been in the area of word processing. Some administrative areas have selected word processing software because of staff working knowledge of the software, rather than the more relevant factor of processing capability. Computer Services is attempting to provide training in the use of word processing software so that departments do not become locked into selection of outdated word processing products.

- Innumerable microcomputer software are available in the areas of data base management, spreadsheets, communications, graphics, utilities, and other categories. Users need advice, training, and suggestions in the use of these products. Traditionally many properly selected software packages have gathered dust for lack of training by computer departments.

- Microcomputer operating systems, communication packages, and the basic hardware itself are becoming increasingly complex. It is advisable that current and potential microcomputer users be given the opportunity to receive basic instruction about the full capabilities of their equipment.

  If the appropriate level of training is provided, employee productivity will increase. We need to commit additional resources to provide adequate levels of training. This will require two additional staff to start a program over the next three years.

Consulting

Consulting was the next most requested area of support. Thirty percent of the departments requested consulting. Consulting provides users someone to contact in the case of a computer problem or requesting information about a product or service. Most of the computer problems consist of not knowing how to use a system, i.e., lack of training, documentation or errors in the application programs that currently exist.

Also, as part of consulting, we provide review on computer equipment requests. Computer Services is responsible for reviewing all computer equipment and software requests from all the departments. We provide an indepth review of each request making sure the equipment and software will meet the users needs. Users want to be kept informed about what is happening in the future in their area. What type of computer system should we purchase to support our area in the future? What should I buy? We work with the user from acquisition, installation, training, and consulting.

An important area of consulting performed by Computer Services involves not only reviewing user needs, but also providing direction in standardizing general purpose software. Of the thousands of software items available in the marketplace, relatively few can be selected to meet most users' needs. By providing direction in the form of recommending standards for various purposes, we are better able to support, train, and assist users.

A more general type of consulting is needed to a greater degree than is currently able to be provided. This is in the area of basic systems analysis in the use of microcomputer hardware and software to solve informational problems. Assuming that the proper hardware and software application programs have been selected, the user often needs professional help with implementing a workable solution using the available tools, we believe an increased emphasis in this area will pay dividends in increased productivity and fuller utilization of the available microcomputing equipment.

We currently have 279 microcomputers on campus and have only one FTE to support all the systems. We need additional help in the consulting area. We are requesting additional staff to provide an adequate level of support.

Programming

Programming was requested by 25 percent of the departments. Programming provides users assistance in changing current application programs, setting up new programs, adding options to old programs, modifying reports, and collecting other information for reporting and analysis. Programming assistance is very specialized and time consuming. Programming support is provided by the Administrative Systems and Information Support Services departments within Computer Services. Administrative Systems provides programming support for the major administrative applications. Information Support Services provides programming support for end user applications. This includes microcomputer and mainframe decision support systems. ISS has only one full-time staff member to provide programming support. We expect a tremendous growth of end user computing over the next several years. We need to provide a high level of support.

Currently all the administrative software application programming support is provided through Administrative Systems. There are nine full-time employees. The following figure shows the minumum administrative programming support requirements for the current administrative applications on the IBM mainframe.

ADMINISTRATIVE SYSTEMS PROGRAMMING SUPPORT REQUIREMENTS

	FTE REQUIRED ANNUALLY			
Application	*FY87*	*FY88*	*FY89*	*FY90*
Student Records (SRS)	.50	.50	.50	.50
Billing & Receivables (BRS)	.25	.25	.25	.25
Financial Aid (FAS)	.25	2.00	.50	.50
Payroll/Personnel (PPS)	4.00	1.00	1.00	1.00
General Ledger (GLS)	.00	.00	.00	.00
Capital Assets (CAS)	.50	.00	.00	.00
Management Information (MIS)	.00	.50	.50	.50
Problem Reports	1.00	1.00	1.00	1.00
Supervision	1.50	1.50	1.50	1.50
Backlog	1.00	.00	.00	.00
Total FTE	9.00	6.75	5.75	5.75

Figure 52. Minimum Administrative Programming Support Requirements

In FY87 we are totally allocated with nine positions with one person dedicated to work on the programming backlog. FY88-FY90 we will have about 1.25 FTE positions to work on the current backlog of administrative applications and any new applications that are requested. Turnover in this area has been a problem in the past. Our staffing has averaged about five people the last three years. Only if we can stay fully staffed will we have sufficient people to work on current as well as new application projects. We are requesting additional administrative programming staff and contract programmers as new systems are acquired/developed.

Documentation

Documentation support was requested by 21 percent of the departments. Computer documentation is important for several reasons:

- To guarantee that vital information about a system is never lost when an employee leaves.
- To provide the mechanism for individual learning and self-study as a supplement or possible alternative to initial training and later consulting.

Well-written documentation geared to end users can supplement or substitute for first-time user training. Reference documentation that describes advanced or lesser-used features can supplement face-to-face or telephone consulting. When departments have employee turnover then the

documentation can serve as the training method of the system. This may save staff time not only for our department, but for the end-user department concerned.

Most of the current documentation is poor or nonexistent for the end users. Information Support Services is responsible for upgrading user documentation. This area has started to make a dent in the documentation effort. Although users have expressed satisfaction with those documentation projects already completed, more staff is needed to provide the users with an adequate level of user documentation support.

After reviewing the survey material and the interviews with the departments, user support is critical to the success of computing on campus. We currently have three full time staff members that provide all the training, documentation and consulting support for end user computing.

We need more people to provide more training, programming,and additional documentation. As more computer equipment and software is used in the departments at the college the more training and documentation is needed. We need to look at every mechanism possible to provide the support.

We have one fulltime Lead Technical Writer/Editor who is responsible for providing end user documentation in the form of user manuals for all administrative information systems, communications products, and microcomputing tools in administrative use. The amount of effort needed to update and expand exisiting documentation, provide user manuals for newly developed applications, and expand and develop new areas of user documentation in the areas of word processing, microcomputing, and communication technology is considerable.

General microcomputing support is provided by the Information Center Specialist position. Considering the rapid increase in the amount of administrative microcomputing equipment at the institution, a three-fold increase in less than three years to approximately 100 microcomputers, this position is in need of assistance.

Recommendations

The following recommendations will provide the computer training necessary to improve computer literacy on campus:

- **Develop program/user seminars on computing.**

  Develop program/user seminars on computing as to what is happening today, how computing can be used effectively in a given department. Many current and potential computer users are not aware of what is available. Regular seminars will help eliminate this information gap and allow users to ask the right questions.

- **Incorporate computers into simple activities.**

  Incorporate computers into simple activities. Activities that should be promoted include wide use of electronic mail for simple messages, calendaring facilities and administrative schedules.

- **Use the computers that currently exist on campus to improve productivity.**

  Effectively utilize computers into daily activities. Such activities should include downloading data from the mainframe system into both AS and microcomputers for analysis and reporting, effective and wider use of word processing, and incorporating graphics for reporting and presentation.

- **Provide additional training, documentation and consulting.**

  Hire four additional personnel for end user computing to provide support for training, documentation, and consulting

Hardware Needs

Terminals and printers are needed for the end user to access information that is stored and printed from the mainframe. The figure below shows the future hardware needs as requested by the user departments using the current applications.

Computer literacy is the first step in any training process. People need documentation to be made aware of what computers can do; only then can we can incorporate computers into the work environment with the proper training support. Without proper documentation, all our sophisticated systems can never be expected to perform with maximum efficiency.

FY88-90 HARDWARE NEEDS

DEPARTMENTS	*DEVICE TYPES** *A*	*B*	*C*	*D*	*E*	*F*
PRESIDENTS						
Office of President		1	1			
Auditor	1					
CENTRAL CAMPUS						
Office of Provost		2	2			
Automated Office Instruction						
Humanities & Liberal Arts	1			2	1	
Social & Behavioral Sciences	2	1				
Natural Sciences				1	1	
Occupational & Vocational Education	3	1				
Business & Services	4	1			1	
Student Affairs		3	8		1	
Learning Resource Center	1					
OPEN CAMPUS						
Office of Provost		1	1			
Academic Alternatives		8	10			1
Business & Professional Institute	3					
Regional Center - Southwest		1	1			
Regional Center - East		1	1			
Regional Center - North			1			
Community Education	1	1	1			
ADMINISTRATIVE AFFAIRS						
Office of Vice President		1	1			
Campus Services	1	1	1			
Auxiliary Enterprises						
Financial Affairs	3					
Human Resources	1	2	3			
Purchasing	2					
Public Safety		1				
PLANNING & INFORMATION						
Office of Vice President		1	1			
Computer Services						
Admissions, Registration & Records	10	3	3			
Research & Planning						
EXTERNAL AFFAIRS						
Office of Vice President		1	1			
Public Information/Media Production		1	2			
Development						
Campus & Community Events						
TOTALS	25	35	42	3	4	1

*A-IBM Terminal
B-IBM Printer
C-IBM Micro
D-Wang Terminal
E-Wang Printer
F-Wang Archive

Figure 53. FY88-90 Hardware Needs

The departments feel they need 25 IBM type terminals, 35 IBM type printers, and 42 IBM microcomputers for the use with the current applications. This should provide adequate access to the current resources.

Recommendations

The administrative computing hardware needs consist of devices for standalone computing and terminal access to the mainframe. We are recommending that equipment requested above be acquired through the operating budgets that are now established in each department. This will cost about $168,500 to meet the departmental hardware needs.

Action Plans and Financial Considerations

This section identifies each recommendation from the administrative computing section and defines the estimated costs and time frame for acquisition and implementation. The following table shows each major computing area with the items that need to be acquired over the next five years. The tables define the capital cost and the operating budget cost. The operating budget cost is usually the maintenance amount needed to support the hardware/software. Also included is an estimated time frame.The timeframe serves as a priority for what needs to be completed first. This identifies when the item should be acquired, installation date and estimated production date.

ADMINISTRATIVE COMPUTING

Item	*Budget Estimate* *Capital*	*Operating*	*Time Frame* *Acquire*	*Installation*	*Production*
Administrative Software					
Business System			Oct 87	Jan 88	Jul 88
Purchase Package	$240,000				
Consulting	50,000				
Total	$290,000				
Student System			Jul 88	Sept 88	Jun 90
Purchase Package	$300,000	$25,000			
Consulting	100,000				
(1) Support Staff		30,000			
Total	$400,000	$55,000			
RSVP System	$50,000	$5,000	Aug 88	Oct 88	Jun 89
Total	$50,000	$5,000			
Library System					
Phase I	$70,000	$7,000	Aug 87	Oct 87	Jun 88
Phase II	210,000	21,000	Aug 89	Oct 89	Jun 90
Total	$280,000	$28,000			
Office Automation - Pilot					
Purchase Package	$40,000	$ 1,500	Aug 90	Oct 90	July 91
Terminals	20,000	1,000			
(1) Support Staff		30,000			
Total	$60,000	$32,500			
Degree Audit			Aug 90	Oct 90	Jun 91
Purchase Package	$80,000	$8,000			
Total	$80,000	$8,000			
Management Information			Aug 90	Oct 90	Jun 91
Purchase Package	$50,000	$5,000			
Total	$50,000	$5,000			
Voice Response System			Aug 91	Oct 91	Jun 92
Purchase Package	$120,000	$12,000			
Consulting	20,000				
Total	$140,000	$12,000			
Career Planning			Aug 92	Oct 92	Jun 93
Purchase Package	$50,000	$5,000			
Total	$1,400,000	$150,500			

Figure 54. Administrative Computing Estimated Budget (Part 1 of 2)

ADMINISTRATIVE COMPUTING (Continued)

Item	*Budget Estimate* *Capital*	*Operating*	*Time Frame* *Acquire*	*Installation*	*Production*
End User Applications					
Access to IBM AS					
(2) Graphics Terminals	$3,000	$200	Aug 87	Oct 87	Jan 88
(2) Terminal Interfaces	1,000	100	Aug 87	Oct 87	Jan 88
Upgrade Open Campus	14,000	500	Aug 87	Oct 87	Nov 87
Upgrade Central Campus	4,000	200	Aug 87	Oct 87	Nov 87
(2) Graphics Terminals	3,000	200	Aug 88	Oct 88	Jan 89
(2) Graphics Terminals	3,000	200	Aug 89	Oct 89	Jan 90
Total	$28,000	$1,400			
High Quality Printing					
(1) Laser Printer	$7,000	$1,000	Aug 87	Oct 87	Jan 88
(1) Laser Printer	7,000	1,000	Aug 88	Oct 88	Jan 89
(1) Laser Printer	7,000	1,000	Aug 89	Oct 89	Jan 90
Total	$21,000	$3,000			
Download Software	$20,000	$2,000	Aug 87	Oct 87	Jun 88
Total	$20,000	$2,000			
Total	$92,000	$27,000			
Departmental Hardware					
(15) Terminals	$15,000	1,500	Aug 87	Oct 87	Jan 88
(10) Terminals	10,000	1,000	Aug 88	Oct 88	Jan 89
(20) Printers	10,000	1,000	Aug 87	Oct 87	Jan 88
(15) Printers	7,500	750	Aug 88	Oct 88	Jan 89
(20) Micros	60,000	2,000	Aug 87	Oct 87	Jan 88
(22) Micros	66,000	2,000	Aug 88	Oct 88	Jan 89
Total	$168,500	$8,250			
Support					
Training					
(1) Support Staff		$30,000	Aug 88		
(1) Support Staff		30,000	Aug 89		
Total		$60,000			
Consulting/Documentation					
(1) Support Staff		$30,000	Aug 87		
(1) Support Staff		30,000	Aug 89		
Total		$60,000			
Total		$120,000			
Total	$1,637,500	$285,150			

Figure 55. Administrative Computing Estimated Budget (Part 2 of 2)

The total amount needed for administrative computing is $1,637,500 of capital funds and an increase of $285,150 in the operating budget. See the final section of the plan for a breakdown by fiscal year. Because of the length of time required to implement the administrative software applications, some of the timeframes extend beyond the three year timeframe of the plan. It is important to identify a time frame for all needed applications.

CENTRAL COMPUTING

Overview

Central computing is all the support in system hardware, software and personnel that is shared with academic and administrative computing. There is overlap between academic and administrative computing that must be defined that was not discussed in the previous sections. This includes governance issues, computer operations, system hardware and software, and campus-wide communications. In this section we will evaluate the central computing concerns and recommend a direction in each area that will meet our current and future needs.

Governance

The governance structure is the body of persons that constitute the governing authority of the organization in dealing with computing on campus. The current structure consists of a Computer Services Management Committee (CSMC) and two advisory committees: the Administrative Systems Users Advisory Committee (ASUAC), and Academic Computer Planning Committee (ACPC).

The Computer Services Management Committee is responsible for the institutional policy decisions relating to computing, determining the computing priority issues on an institutional basis, capital budgeting and funding level recommendations to the board, review and approval of the planning process, and the use of new information technologies on campus. The committee consists of the President, Provost Central Campus, Provost Open Campus, Vice President Administrative Affairs, Vice President External Affairs, Vice President Planning and Information, and Executive Director Computer Services.

Administrative Systems Users Advisory Committee is an advisory committee to the Executive Director of Computer Services and the CSMC. The committee is responsible for administrative computing issues on campus. The group deals with setting priorities on administrative programming requests, reviewing data and data base needs, administrative software application needs, and computer hardware needs. They are also responsible for reviewing policy, procedure and planning issues.

The membership consists of at least one representative from each major area of the College and additional representation from major computing users. The current membership consists of: the Director/Controller Financial Affairs from Administrative Affairs; the Dean of Business and Services, Director Student Financial Aid, and Director Technical Services/Utilization from Central Campus; Coordinator Campus and Community Events from External Affairs; the Associate Dean from Open Campus; Director Registration and Records, and Director of Research and Planning from Planning And Information; the Executive Director, Manager of Administrative Systems, and Manager of Information Support Services from Computer Services.

The Academic Computing Planning Committee is an advisory committee to the Executive Director Computer Services and CSMC. The committee is responsible for academic computing issues on campus. The current charge is to gather and evaluate information on academic computing and provide input to the planning process. They are responsible for evaluating computing resources and making suggestions on how to improve computing on campus.

The membership consists of representatives from the following academic areas of the college: Business and Services, Computer Services, Humanities, Learning Resource Center, Manufacturing Technology, Natural Learning Resource Center Sciences, Occupational and Vocational Education, Open Campus, and Social and Behavioral Sciences.

Computer Services reports to the Vice President Planning & Information who, in turn, reports to the president of the college. Appendix H is an organizational chart of the institution showing the reporting structure of Computer Services. The Executive Director of Computer Services is responsible for academic and administrative computing. Functional responsibilities include planning and the operation of the computer systems. Computer Services is divided into five departments: Academic Computing, Administrative Systems, Information Support Services, Operations, and Technical Support Services. See the current environment section for a list of responsibilities for each department.

Computer Services originally provided support for data processing only, i.e. business functions. Later academic computing support was added. In the last year we have moved into word processing and personal computer support. Several new areas are emerging, i.e. office automation, printing systems, and communications, that need greater coordination, planning and support.

The trend in higher education is to have a single individual coordinate and plan for computing on campus. As the organization changes and evolves to incorporate information technology into its business activities, coordination and planning for information technology including communication, office automation, data processing, library automation, printing services, and personal computers are imperative.

Recommendations

The following governance changes will improve the organizational structure of computing:

- **Change "Computer Service" to "Computing and Information Technology."**

  The name of the area "Computer Services" is no longer appropriate for the responsibilities assigned to Computer Services. The following department name changes will provide greater meaning and applicability for the current and future computing functions.

  The Computer Services department name should be changed to "Computing and Information Technology." The college will be changing over the next ten years to information based sources. Today and in the future we will deal with data stored in the computer, text that is typed on a word processor, voice over a telephone system, graphics that are computer generated, and image that needs to be computerized. The major direction is information technology -- the integration of all forms of information in the hands of the user. For this reason, incorporating "Information" into the department title is an appropriate step already mirrored in other institutions across the country.

- **Change the department names within Computer Services to reflect the functions and support provided to the institution.**

  Change "Information Support Services" to "End User Support Services"

  Change "Academic Computing" to "Academic Support Services"

  Change "Computer Operations" to "Operational Support Services"

  Change "Administrative Systems" to "Administrative Support Services"

- **Change "ACPAC" to reflect advisory responsibilities.**

  Modify the current "Academic Computing, Planning Committee" title to "Academic Computing Planning and Advisory Committee" ("ACPAC"). The Executive Director of Computer Services will serve on the committee to allow direct input from faculty to computing management.

- **Update the *Institutional Plan for Computing* on a yearly basis.**

  The *Institutional Plan for Computing* should be updated on a yearly basis. Each year an addendum will be generated for any changes, as an additional year is added. Every three years the plan will be completely revised.

System Software Needs

Systems software are the program/applications that support the operation of the central computing facility. This includes operating system software, security, performance monitoring, system accounting and charge back, and data center management software.

Operating System Software

Our current operating system consists of three separate environments: VM/SP, VSE/SP, and MUSIC. Each of these were discussed in the current environment section of this report. VSE/SP provides the bulk of our administrative application needs including batch, online CICS and data base functions. MUSIC provides a student environment totally separate from the administrative systems. MUSIC provides a highly controlled and manageable online environment for students.

Of the three current operating systems, only VSE needs to be examined. The basic problem with VSE comes from its batch orientation and its tremendous lack in error recovery and management functions. Because of this CICS and data base software are severely limited in their ability to keep up with technology.

Recommendations

The following recommendations provide a direction for mainframe operating system software:

- **Retain current operating system environment of VSE, VM and MUSIC while monitoring technology and evaluate on a yearly basis.**
- **Base any additional system software on the VM environment.**

System Accounting

Computer job accounting is a dual purpose tool used to bill end-user groups for resources used and to collect information regarding the end-users current demands on system resources. It helps to identify immediate problem areas and to effectively plan for future growth. Presently there are only automated accounting procedures for VSE/SP batch execution requests. Our current job accounting software does not provide adequate information for accounting on all systems.

There is a need to monitor the VSE/SP online tasks as well as the activity of the VM/SP system to more accurately examine the current and future resource needs in those areas.

Recommendations

- **Provide a system accounting package.**

  Analyze the available products for VM/SP and VSE/SP online in order to purchase them in FY88. The cost of the product would be about $15,000 with an annual maintenance of $1,560.

Data Base Management Tools

The IDMS/R data base management system recently purchased does not provide a good set of tools for analysis and problem determination. A more extensive set of tools is available for IDMS/R. Listed below are brief descriptions of some of the capabilities needed.

- A tool to check for physical data integrity and also to correct the problem.
- A tool to prioritize the placement of data records in the data base to reduce the amount of overflow and minimize its effect on performance.
- A tool that allows for online execution of DML commands to phototype navigational program logic or to be used for small system utility purposes rather than developing seldom used COBOL programs.

The analysis tools provide detailed reports on the status of the data base journals, logs and data files.

Recommendations

- **Provide DBA tools to improve employee productivity.**

  Purchase the DBA Toolkit at a cost of $38,000 and $7,000 per year for maintenance.

VM Management Tools

The native VM/SP system that we currently operate in does not include several of the system management tools necessary to adequately control the environment or analyze usage to optimize performance and plan for growth. VMCENTER is an integrated package which could enhance or add the following control to our VM/SP computing environment.

- System Security would provide complete system and data access protection with the information for a comprehensive audit. In addition a more flexible password mechanism is established.
- DASD Management could assure proper allocation and maximized use of DASD, as well as performance tuning of the DASD and billing capablities.
- Data Integrity offers a backup system to protect data from hardware failure and user error. In addition it provides data encryption and access rules/passwords by userid and groups for greater control over data access.
- Workload Balancing provides a time driven job dispatcher to more evenly distribute the work submitted to VM. More effective capacity planning is possible with the detailed workload information generated by this utility.
- Operations efficiency can be improved with the automated production job scheduling and tape management system. These tools make standard label processing, not native to VM, available to ensure efficient and correct mounting of tapes.
- Guest System Support would include merge the VSE/SP accounting information with the VM records to more accurately establish end-user activities. The automated scheduling feature of VMCENTER can also accomodate VSE/SP or any other guest system thereby reducing operator/user training.
- Management Reporting produces over 60 standardized reports to aid management of accounting, system backup, tape management, job scheduling, security and capacity planning. In addition, a number of prescriptive reports identify potential problems in the system and recommend solutions.

The current use of VM/SP is in an interactive environment such that each requested task must complete before the user can initiate the next task. Batch processing allows users to process many jobs simultaneously. This provides an increase in user productivity and can also be used to balance the resource load with automated job submittal during off peak hours.

Recommendations

- **Provide system management software for VM.**

  Purchase VMCENTER in FY87 and drop the charges being incurred for VMBACKUP, VMArchive, and CA/JARS. This product may also eliminate the need for additional security packages on VM being considered. The permanent license fee is $44,000 which includes the maintenance for 1 year. Thereafter the charge is about $10,600 or 13.5% of each of the VMCENTER component prices. These prices are as of 1/1/87.

  VMBATCH should also be considered with its initial target use of all SCRIPT jobs. The permanent license fee is $9,000 with a 15% yearly maintenance fee after the first year.

System Security

There is system security available on each operating system VM, MUSIC and CICS under VSE. Also within each operating system the applications, i.e. CDAS, have built in security for each user. The application security is difficult to maintain and is inflexible to change. This causes severe management and control problems.

The major problem deals with the security on our data files that reside on disk and tape. Currently no security exists for a user with knowledge of how to get to the files. We did purchase a data base, IDMS/R, where data security is invoked, but until we convert all applications over to data base all existing applications using VSAM are vulnerable to access.

Recommendations

- **Provide an improved security system on the IBM mainframe.**

  Acquire a security package flexible and easy to manage that will work with our current VSE environment and provides resource security on disk and tape files. The security package should be purchased in FY88 and installed as soon as possible. The cost of the package would be about $16,000 with an annual maintenance of $2,800.

Support Needs

Currently Computer Services has two full-time systems programmers and one manager providing systems programming support for VM, VSE, Intergraph, CLSI, HP3000, and data communications at the central facility. Since we are moving very aggressively in adding new systems, the data base responsibility requires a full-time person. As new systems are added and responsibilities grow, additional support will be required.

Recommendations

- **Provide additional support for the IDMS/R data base.**

  We need one additional person to support the IDMS/R data base. This will cost about $35,000 per year.

Operational Needs

The following concerns deal with the operation of the central computing facility.

- Electrical power problems to the mainframe
- Adequate space in the computer room for equipment expansion
- Access to departmental reports in the I/O area
- Additional operational hours

Computer Room Space

With the expansion of computer equipment over the last several years, the current computer room space is limited. The current configuration will only allow for one to two more years of expansion. When the new microprocessing center is completed, the current MUSIC terminal lab will be moved. This will provide space for expansion to allow for movement of old equipment and new equipment to be located. The MUSIC terminal lab is a raised floor area which is accessible to the current computer room. There would be no cost to expand to this area.

Recommendations

- **Expand computer room facilities.**

  Upon completion of the microprocessing center and movement of the MUSIC terminal lab, utilize the current MUSIC terminal lab area as an expansion of the existing computer room.

Electrical Power

To most people a power problem occurs when utility power is out long enough to cause inconvenience, interruption of the daily routine, or physical discomfort due to loss of heating or cooling. Power problems are far more serious when they effect computers and communications used at the college.

There are several types of power disturbances that can adversely affect sensitive electronic systems. Examples of these are spikes, sags, brownouts, flickers, and blackouts.

Spikes, often referred to as transient impulses, are voltage pulses that accompany the normal sine wave. They can vary from a few volts to several thousand volts in magnitude. Spikes can cause immediate or latent hardware failures. Newer generations of electronic components are generally more prone to failure due to lowered tolerances as a result of miniturization. Software and data can be lost, scrambled or changed. Latent data disruption can be exhibited long after the actual disturbance took place. The usual causes of transients are lightning storms and arcing devices such as welders and motor starters.

Momentary problems such as *sags* and *surges* are brief reductions or increases in utility voltage. They usually occur when a major change in load occurs, such as the start or stop of a large motor. A voltage sag or surge outside of the tolerance level of the electronic system can cause equipment failure, weakened components resulting in latent failures, lost or scrambled data and unscheduled shutdowns. Generally equipment that requires a constant voltage source, such as moving head disk drives, is most affected by these power problems.

The *brownout* is an extension of the momentary voltage problem. It is a systematic reduction of utility voltage during peak demand periods. The reduction normally falls within the + 10% tolerance limits of sensitive electronics. However, brownouts combined with other power disturbances can become a problem. Brownouts do not usually cause major problems. Most electronic systems can tolerate a drop in utility voltage of 10% or less. The real problem occurs

when other power problems, such as an otherwise minor sag, add to the problem. At that point the effects of the brownout are the same as for other power problems.

A *flicker,* or momentary complete loss of utility power, occurs frequently when a utility feeder switch takes place, or during storms when utility protective equipment momentarily interrupts service.

Blackouts occur when there is a total loss of utility power. They can last a few minutes, hours, or in severe cases, days. They are caused by utility equipment, construction mishaps, and weather related problems. The blackout can be the most damaging and troublesome of all problems. Sudden loss of power can result in damage to the hardware and software, such as disk crashes and loss or scrambling of data. A brief outage can result in hours of time required to bring a large computer back online. A lengthy power outage can result in considerable loss of revenues from stopped production and processing of data.

The most damaging of all power problems is the *dirty-off* and *dirty-on.* As power fails, and when power returns, it does so in a "dirty" fashion. The outage is usually accompanied by spikes, sags, and surges. The dirty-off and dirty-on associated with the power failure are particularly damaging. All of the hardware and software problems previously mentioned are likely to occur.

From 1984 through 1986, the main computer facility has experienced an average of fifteen power failures per year. These failures effected the operation of as little as one peripheral to the entire computer system. If power is lost to a single disk drive, control unit or major piece of equipment then the entire computer system may be inoperable. If this power outage occurs during critical periods, i.e. registration, it can cause signicant delays. Last year we had one outage that caused the system to be down 12 hours during the registration process.

There are different solutions to each type of power problems. Isolated and regulation systems smooth fluctuation in line voltages. Line conditioners will take care of spikes, sags, surges and brownouts. Motor generators provide protection from all the above and the dirty-off and dirty-on. UPS provides the greatest protection with a battery backup in a soft shut down over 15 minutes.

The motor generator is a cost effective high performance power problem-solver. The M-G will provide excellent protection against spikes, sags, surges, brownouts, short-term power outages (flickers) and the adverse effects of the dirty-off and dirty-on associated with power outages.

Solid State UPS Systems provide protection against the majority of power problems including spikes, sags, surges, brownouts, short and longer term power outages and the dirty-off and dirty-on. In addition to excellent power conditioning, the UPS will provide time to perform an orderly shut down in the event of a power failure in excess of battery run-time. This provides the greatest protection from power failure. We are recommending the purchase of a 75 KVA UPS.

Recommendations

- **Provide a power backup system for the IBM mainframe.**

  Our current capacity is about 40 KVA. We are recommending the purchase of a 75 KVA with a 15 minute battery backup. This will provide us the capacity to add additional equipment for 10 to 15 years. The system will cost about $52,000.

I/O Area Access

The current I/O area was designed poorly to serve the needs of the users and provide security to the computer room area. Currently there are lock boxes available to user departments to retrieve printed reports from the I/O area. There were not enough lock boxes for each department so many users had to double and triple up on using the boxes. This is a security problem in users having access to other department reports. Currently all users do not use the boxes but enter directly into the I/O department area where they have access to all reports. The users access the I/O area through the student MUSIC lab. Assuming we move the expansion equipment into this area, security of this equipment will be a problem.

Recommendations

- **Remodel the computer room.**

  Review current floor plans and provide a solution to equipment expansion. Construction funds may be needed to remodel this area to meet our needs within three years.

Additional Operational Hours

The computer operations area needs to be open 24 hours per day several days per week. Currently, the operations area is not open on Saturday nights or Sunday days. We need to expand the operational hours because of the additional production jobs that are requiring more time. We feel that by adding another computer operator 40 hours per week we will provide 24 hour operation.

Recommendations

- **Expand hours of computer operations.**

  Add a computer operator to expand operation hours to 24 hours per day, 7 days per week, at a a cost of $15,000 per year.

Staffing

Over the last several years Computer Services has experienced serious staffing turnovers in the programming areas. In FY86 we had a turnover rate of 90 percent in all the programming positions. Computer programming staffing turnover is a problem in most higher education organizations. It is a greater problem at College of DuPage because of the lower salaries.

The reason turnover is a problem is because of the technical nature of the positions and the demand for computer professionals. The programming staff supports the new application development and the ongoing maintenance of existing systems. When a programmer leaves the organization it causes problems in completing current projects on time and fixing current problems with systems. Because College of DuPage is located in the Chicago area we compete with private industry. Staff can find new employment easily without moving with increases ranging from $5,000 to $10,000. Most computing positions are industry independent. That is obvious by our high turnover rate.

The turnover problem can be addressed in the following ways:

- Career path plan
- Cross training of staff
- Training
- Contract programming

Career Path Plan

We have setup a career path plan that allows flexibility in promoting employees in place when they meet the qualifications of the next higher position. Also included in the plan are entry level salaries based on the amount of experience and education. The plan was put into effect in July 1986 and appears to be working. We may need to adjust salary levels based on the Chicago market.

Cross Training

The cross training of staff is very important to the continued and reliable support of the existing applications. Cross training is when we train more than one person to be an expert on the system. Cross training does provide motivation to employees when working on different projects. It has been difficult to cross train when staffs are too small.

Training

In order for computer professionals to develop, education is very important. Each employee needs to be given educational opportunities to attend seminars, conferences, and educational classes in the area. We are currently providing the necessary training to the staff. This must continue to be provided.

Contract Programming

Contract programming has been used to augment the existing staff to complete many of the administrative programming requests. In the last two years, we have used contract programming to make significant improvements in the financial aid, student registration, and management information system; and assist with the human resource system implementation when we had a complete turnover of the project team.

Although contract programming is very expensive--$40 to $50 per hour--it provides high level expertise in short notice. This allows projects that would have been delayed months because of a turnover to be delayed only three to four weeks.

Contract programming should be an integral part of support to the institution.

Recommendations

The following recommendations will provide stability and continuity in support of computing on campus:

- **Maintain equitable salary levels.**

  Continue to monitor salary levels in the Chicago area and make adjustments according to demand.

- **Provide sufficient funding for training.**

- **Use contract programmers where necessary.**

  We are recommending an increase of $30,000 per year to work on projects where staff turnover has affected a project. The funds could also be used to reduce the backlog.

System Hardware Needs

Computer equipment needs are based on the growth of existing applications and new applications that are to be purchased or developed. In situations where the growth exceeds the capacity and the capacity cannot be expanded, the equipment must be replaced. If the equipment cannot perform a certain necessary function, even with upgrading, then the equipment must be replaced. In the following sections we will identify the hardware component needs for the next three years.

Computer equipment needs on the IBM system can be defined by four major areas: disk space, ports, CPU memory, and CPU power in MIPS.

Disk Space

Disk space defines where the information and computer programs are stored on the computer system. Currently we have a total capacity of 10,000 megabytes or 10,000,000,000 characters of storage. The disk space is defined by the current application usage including administrative, academic, and systems; the estimated growth from 1988 to 1990; and the new applications that are planned over the next three years. The following figure shows a complete breakdown by application of all the disk space used on the IBM mainframe.

CURRENT APPLICATION SYSTEM DISK SPACE NEEDS

Current Applications	*1987*	*Projections** *1988*	*1989*	*1990*
Administrative Software Applications				
General Accounting System				
Purchase Orders	75.2	3.8	3.8	3.8
Vendors	4.7	0.3	0.3	0.3
Accounts	263.2	20.0	0.0	0.0
Journal Entry/Cash Receipts	150.4	7.5	7.5	7.5
Invoices	267.9	5.0	5.0	5.0
Capital Assets				
Inventory	70.5	2.1	2.1	2.1
Human Resource Systems	600.0	60.0	60.0	60.0
EZ-List	235.0	20.0	20.0	20.0
Student Financial Aid System	80.0	5.0	5.0	5.0
Student Billing and Receivables	728.0	10.0	10.0	10.0
Student Records				
Class Roster	113.0	3.4	3.4	3.4
Course Terms	56.0	.0	.0	.0
Student Term	1086.0	50.0	50.0	50.0
Student Key	55.0	5.0	5.0	5.0
Management Information System	100.0	100.0	25.0	25.0
Application System	400.0	200.0	100.0	100.0
Script/Word Processing	100.0	100.0	100.0	100.0
Academic MUSIC/VSE/SQL	300.0	.0	.0	.0
Other-Miscellaneous	317.0	100.0	100.0	100.0
System Software Applications				
IBM VM	600.0	.0	.0	.0
Production VSE	600.0	.0	.0	.0
Development VSE	300.0	.0	.0	.0
Student VSE	300.0	.0	.0	.0
MUSIC	300.0	.0	.0	.0
Student SQL/VSAM	300.0	.0	.0	.0
Temp Space/Sort	400.0	100.0	100.0	100.0
Total Megabytes	***7801.9***	***891.8***	***647.1***	***647.1***

**Megabytes (1,000,000 Characters of Information)*

Figure 56. Current Application System Disk Space Needs

The disk space is defined by administrative software applications and system software applications. The administrative software application disk space includes storage for all the data files, work areas, and programs that support the application. The system software applications include disk space that is required for operation of the computer systems software. In some cases the system software must reside separate in its own area. There is usually a 10 to 15 percent waste of disk space caused by fragmentation into space too small to place data, and certain restrictions where data can be placed.

The figure defines the 1987 disk space used of 7,800 megabytes; 1988-1990 projections are based on the percentage increases expected by the user department by each application. We are expecting a growth of about 6 percent per year for all applications.

We are planning to add new or replacement administrative software applications over the next three years. The figure below defines a list of the applications with the estimated disk space requirements. Included is a timeframe for installation/development of the new applications recommended with the corresponding disk space needs for 1988-1990.

NEW ADMINISTRATIVE APPLICATION DISK SPACE NEEDS

New Administrative Applications	*Disk Space*	*Timeframe* 1988	1989	1990
Financial System General Ledger Accounts Payable Purchasing With Order Entry Inventory Control Cash Managenemt	600.0	300.0	300.0	-600.0
Office Automation	300.0	200.0	100.0	100.0
Position Control	50.0	50.0		
Applicant Tracking	300.0		200.0	100.0
Degree Audit	100.0			100.0
Registration/Records System	1200.0		300.0	600.0
Career Placement System	100.0			
Media Distribution System	100.0			
Mailing List	250.0			
Total Megabytes		*550.0*	*900.0*	*300.0*

Figure 57. New Administrative Application Disk Space Needs

The new application list are major applications that require significant disk space. Reference the administrative software application section for information on each application. If applications are replacements for previous systems, as shown in the financial system, we will recover some disk space. The total space needed for 1988 is 550 megabytes, 1989 is 900 megabytes, and 1990 is 300 megabytes for new/replacement applications.

A summary of the current systems together with the new applications follows:

CURRENT AND NEW APPLICATIONS DISK SPACE REQUIREMENTS

Applications	*1987*	*1988*	*1989*	*1990*
Administrative Software	5601.9	891.8	647.1	647.1
Systems Software	2200.0	0.0	0.0	0.0
New Administrative Software	0.0	550.0	900.0	300.0
Total Megabytes	***7801.9***	***1441.8***	***1547.1***	***947.1***

Figure 58. Current and New Applications Disk Space Requirements

We will increase disk space usage on the IBM by 1441.8 megabytes in 1988, 1547.1 megabytes in 1989 and 947.1 in 1990 to meet the application needs. The following figure shows the history of disk space since 1978 with total available vs. total used with the estimated projections based on the above figure.

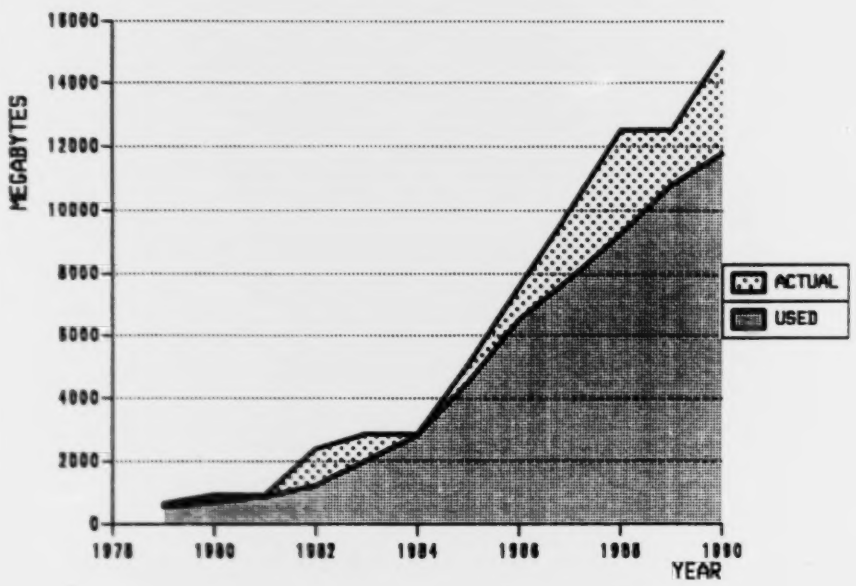

Figure 59. Current and Projected Disk Space Needs for Software Applications

We currently have about 2200 megabytes of disk space remaining, of which 1500 megabytes cannot be used as stated previously. We need 1441 megabytes in 1988 for the new application at the existing application rate of growth. One disk drive provides 2500 megabytes of additional disk space. We will need to purchase one disk drive in 1988. This additional space will meet our disk space needs in 1989. In 1989 to 1990, we will need 2500 more megabytes. One additional disk drive will be needed in FY 90.

Ports

In order to connect terminals, micros, and printers to the mainframe, access ports are needed. The following figure shows the history of ports over the last eight years. From the graph you can see

the tremendous growth that we have experienced in the last three years. In 1986 forty additional terminals and/or microcomputers were connected to the system. As more terminals are connected, the need for other resources grow. We will need 63 additional access ports on the IBM system over the next three years. This will require the purchase of two additional 3274 controllers of 32 ports each.

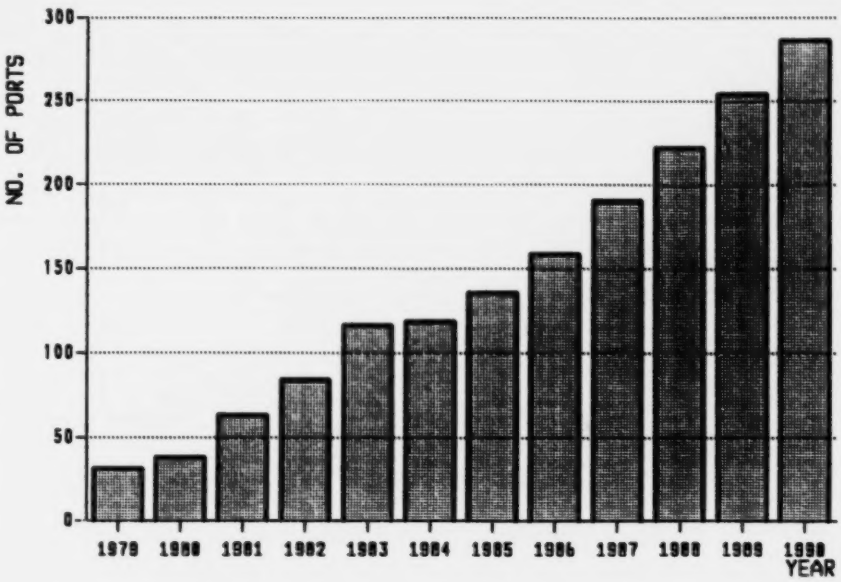

Figure 60. Growth Trend in Ports Required

CPU Memory

The CPU memory defines the number of computer programs that can be executed at one time. Our current system provides 16 megabytes or 16,000,000 characters of information. The memory capacity determines the number of programs that can be run at one time. These programs consist of the operating system and the administrative programs. When additional user ports are added to the system and more programs are executed the system cannot handle all the programs and paging occurs. Paging results from programs competing for more main memory space than is available. The system swaps programs from main memory to disk space. When the paging rate increases, the user receives a slower online terminal response time and system performance degrades.

The following figure shows the memory capacity over the last eight years with the projected need through 1990. If we continue to add additional users to the system, add ports and increase the number of computer programs that are executed, additional memory is needed.

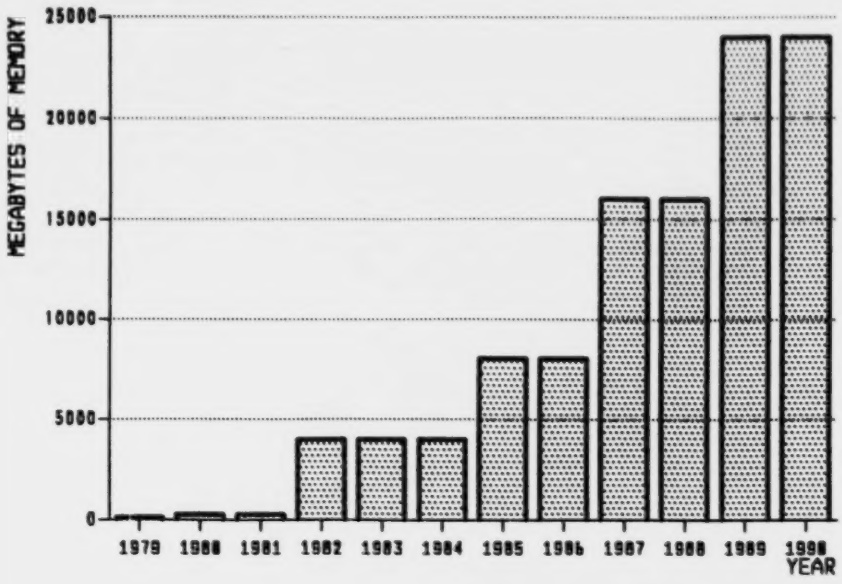

Figure 61. Past and Projected Memory Needs

Our current paging rate ranges from 5 to 10. As the paging rate increases user response time decreases. As we add additional users the paging rate will increase, therefore, causing inadequate response times. Industry standards recommend a memory upgrade when paging rates reach 15 to 20. With the growth of ports as shown in Figure 60 on page 121, the need for additional memory will increase by 1989. We will need an additional eight megabytes of memory which would bring us up to a total of twenty four megabytes of main memory.

CPU in MIPS

The CPU in MIPS defines the number of instructions per second that can be executed. The higher the number the faster the computer. We currently have a 2.1 MIP computer that would execute at a speed of 2,100,000 instructions per second. The following figure shows the history of the MIP capacity.

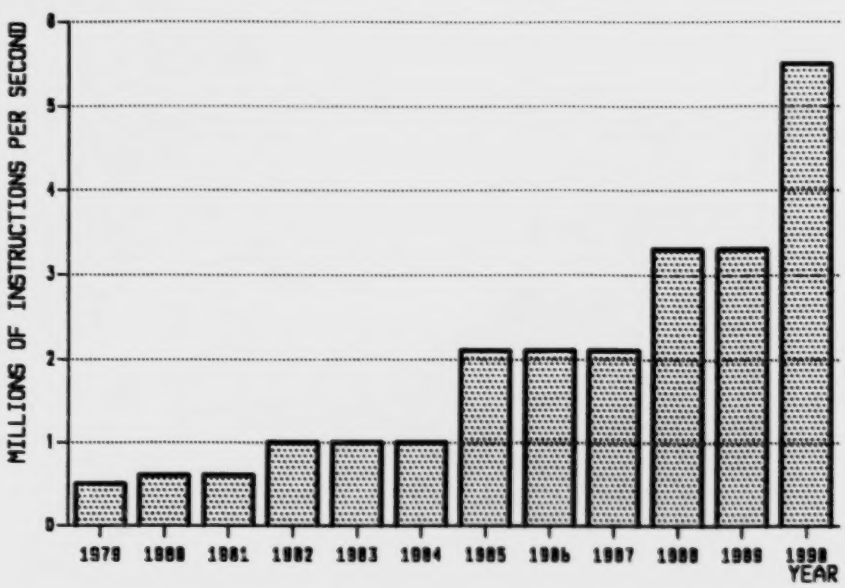

Figure 62. Growth Trend in MIPS Capacity

Currently we have a 70-100 percent CPU utilization rate. We will need to upgrade the CPU power in 1988 from 2.1 MIPS system to 3.3 MIPS. By 1991 we must again review the CPU utilization and plan for the next CPU upgrade. The trend illustrated in Figure 62 indicates that a CPU upgrade lasts three years.

Recommendations

The following recommendations will provide the necessary hardware to support the predicted application growth:

- **Expand terminal access.**

  Provide two 3274 controllers, one in 1988 and one in 1989 to provide additional ports for end user terminals and microcomputers.

- **Expand memory to improve user response.**

  Provide eight additional megabytes of memory for the IBM 4381 in 1989.

- **Upgrade the IBM CPU to provide faster access and greater throughput.**

  Provide a CPU upgrade from a Model P1 to P13 in 1988.

- **Expand disk space to support future and current applications.**

  Provide two IBM 3880 disk drives, one in 1988 and one in 1990.

June 3rd, 1987

Centralized Microcomputer Maintenence

The College of DuPage has a large and growing investment in microcomputer equipment. These resources have been previously described in terms of Academic Computing and Administrative Computing in previous chapters. This section views microcomputing as an institutional resource requiring centralized management.

The institution has 137 microcomputers in academic lab environments, 99 microcomputers used for administrative purposes, and 43 microcomputers in decentralized areas for faculty access and miscellaneous academic use. This equipment is predominately made up of IBM and Apple equipment with a small number of TRS80, Wang, Victor and other equipment. There is a total of 279 microcomputers in use at the institution.

Computer Services has coordinated the installation, troubleshooting, and repair of microcomputing equipment for the institution in a relatively informal manner until recently. The total of 279 microcomputers at the institution have been supported by personnel in Information Support Services and Academic Computing. Major hardware failures have generally been referred to outside vendors on a parts and materials basis. The current number of microcomputers and the prospects for continued rapid growth dictate that more formalized methods be adopted. We have the following recommendations for the effective management of microcomputer maintenance.

Recommendations

- **Provide centralized maintenance for microcomputers.**

  We recommend that a centralized mechanism for controlling and managing the hardware maintenance and repair of all institutional microcomputers be established. This mechanism includes a computerized tracking and reporting system to analyze and evaluate maintenance policies and procedures. Computer Services will be responsible for administering this system.

  We recommend that a single maintenance account be established for the maintenance and repair of all microcomputer equipment at the institution. Maintenance would be performed on a time and materials basis rather than a service contract on each microcomputer system.

  The Computer Service's administered tracking system will identify individual equipment requiring high maintenance. Machines may be placed on service contracts on an individual basis if a pattern of high maintenance costs is identified for specific systems.

  Each area acquiring microcomputers should set aside an additional ten percent of the purchase price of the equipment for maintenance costs. The details of funding the maintenance account are yet to be finalized, but we recommend establishment of a revolving account containing the initial ten percent maintenance cost funding from the individual areas. All maintenance would be paid from this account. Centralized administration of the maintenance costs will permit close analysis of the true maintenance costs as well as the efficient and timely repair of microcomputer equipment.

  We recommend the acquisition of a small inventory of microcomputer components that can be used as loaned equipment for system components requiring repair. This equipment would include a small number of monitors, printers, keyboards and system units. This procedure would permit the orderly continuation of computer-related work activities while equipment was out for repair.

  We recommend the hiring of a full-time support person for repair of microcomputers, once a determination in cost benefit can be made.

Communications and Networking

Communications now plays a major role in meeting the information needs of the institution. Online systems and distributed processing are now common and the importance of data communications will only increase as local area networks and office automation become cost effective strategies. Therefore, the institution must include network communications in planning.

We currently have about 190 terminals/personal computers located on campus that are connected to the IBM mainframe. The Wang OIS has about 50 terminals and printers connected to that system. All of the connections require cabling from each terminal device to a computer system. Each time a terminal or printer is connected to the system it requires significant labor to run the cable. Some of the cabling lengths can extend up to 4,000 feet. The cabling can cost about ten cents per foot with an estimated installation rate of $1-$2 per foot.

Another problem on campus is the incompatibility of the computer systems. We currently have different computer systems on campus (IBM, Lanier and Wang) that will need to communicate and interface with each other if we want to have a fully integrated campus. Information sorted on one system must be able to be transferred to other systems. This full integration is termed "connectivity" between systems. In order to accomplish connectivity and our many long-range goals, like office automation, we will eventually have to upgrade and/or replace the current Wang and Lanier equipment. The following figure shows the connectivity needs of the institution:

CONNECTIVITY NEEDS

DEPARTMENTS	*CONNECTIONS** 1	2	3	4	5	6	7
PRESIDENTS							
Office of President							
Auditor							
CENTRAL CAMPUS							
Office of Provost		X	X				
Automated Office		X					
Instruction		X			X		
Humanities & Liberal Arts		X					X
Social & Behavioral Sciences		X					
Natural Sciences		X	X			X	
Occupational & Vocational Education							
Business & Services		X	X		X		
Student Affairs		X	X			X	
Learning Resource Center			X				
OPEN CAMPUS							
Office of Provost							
Academic Alternatives		X					X
Business & Professional Institute	X		X		X		X
Regional Center - Southwest							
Regional Center - East	X	X			X		
Regional Center - North							
Community Education	X	X			X		
ADMINISTRATIVE AFFAIRS							
Office of Vice President							
Campus Services			X				X
Auxiliary Enterprises	X	X					X
Financial Affairs	X	X				X	X
Human Resources	X	X					X
Purchasing			X			X	X
Public Safety							
PLANNING & INFORMATION							
Office of Vice President							
Computer Services							
Admissions, Registration & Records	X	X	X				X
Research & Planning	X					X	X
EXTERNAL AFFAIRS							
Office of Vice President							
Public Information/Media Production	X	X					
Development	X	X					X
Campus & Community Events	X	X					X

*1-IBM to Lanier, Lanier to IBM
2-IBM to Wang, Wang to IBM
3-LAN
4-Regional Centers
5-Library System
6-National Networks
7-Buildings on Campus

Figure 63. Connectivity Needs for the College

With the construction of the microprocessing center, communication and networking will play an integral part. As discussed previously, the microprocessing center will need to communicate with the IBM mainframe. All of the microcomputers in the center will be connected to a local area network to provide distribution of software, control, maintenance and security of the systems. The personal computers that are recommended for faculty in individual suites will need to be connected to the microprocessing network which in turn is connected to the IBM mainframe.

By taking this approach we can provide connectivity throughout the whole campus, allow electronic communications for:

- Faculty to communicate with students
- Students to communicate with faculty
- Faculty to communicate with administrators
- Administrators to communicate with faculty
- Administrators to communicate with administrators
- Administrators to communicate with staff
- Staff to communicate with administrators

The direction of the industry in communications is to combine voice, video and data on the same cabling system. Currently all data communication is handled by Computer Services with a separate cabling network. Video communications is handled by the LRC with a separate cabling network. The telephone communications is handled by Auxiliary Enterprizes with a separate cabling network. There are major reasons for integration:

- Technology is available to permit data, video and voice to be carried simultaneously
- Many vendors offer data, video and voice communications products allowing a single vendor support
- Users are finding advantages in linking data, video and voice equipment together for reduced space, shared staffs, improved operation and support, and planning with resultant cost savings

Many institutions across the country have integrated or are planning the integration of voice and data communications. We will need to plan for the eventual integration of voice, video and data on campus if we plan to stay current with technology. The cost savings will be enormous.

There are many advantages of networking on campus. Networking will allow individual users to have access to all hardware and software on the system. Data can be moved from one system to another without reproducing the data, i.e. download data from mainframe to PC or print a report on a local printer or remote printer. The advantages of using a network include the following:

- Improvement in security
- Improvement in reliability and maintenance
- Improvement in access and distribution
- Cost savings through network licensing
- Collection of statistics on usage of software and hardware
- Access to multiple printing devices
- Reduction of communication costs
- Reduction in people support

Recommendations

In order to effectively utilize electronic mail and other integrated activities, the Wang, Lanier and IBM systems must communicate. We are recommending the following:

- **Use the IBM mainframe as the central distribution system for connectivity.**

  The IBM mainframe must be the central distribution system for connectivity. This means that all current computer systems that need to access the IBM must adhere to IBM communications standards.

- **Upgrade the Wang system to a newer technology system VS85 or equivalent to allow document exchange with the IBM system.**
- **Upgrade or replace Lanier systems in Open Campus for all individuals needing access to the IBM system.**
- **Ensure that new computer systems that need access to the IBM mainframe adhere to IBM communications standards.**
- **Expansion of microcomputers in faculty suites should be connected to a network.**
- **Ensure that the new microprocessing center is connected to the IBM mainframe network.**
- **Provide high speed access to regional centers.**

  The three regional centers need high speed access to the central campus just to perform current administrative functions. Each center currently has dial-up access which causes problems in response time and data transmission. Each location will need the following items:

  - Dedicated four wire full duplex leased line
  - Four channel modems

- **Develop a plan for telecommunications.**

  A plan for telecommunications to connect central campus, open campus and the regional centers must be developed to provide a communications network that allows connectivity of computer systems and the continuing support of the system. The proposal should provide a cabling system that would support voice, video and data to be transmitted over the same line.

Action Plans and Financial Considerations

This section identifies each recommendation from the central computing section and defines the estimated costs and time frame for acquisition and implementation. The following table shows each major computing area with the items that need to be acquired over the next three years. The table defines the capital cost and the operating budget cost. The operating budget cost is the maintenance amount needed to support the hardware/software. Also included is an estimated time frame. This identifies when the item should be acquired, installation date and estimated production date.

CENTRAL COMPUTING

Item	*Budget Estimate* *Capital*	*Operating*	*Time Frame* *Acquire*	*Installation*	*Production*
Electrical Power					
Power Backup System	$52,000	$1,000	Aug 87	Nov 87	Nov 87
Operational Hours					
Computer Operator		15,000	Aug 88		
Total	$52,000	$16,000			
Hardware-IBM Mainframe					
CPU Upgrade-P13	$60,000	$1,200	Aug 87	Dec 87	Dec 87
Terminal Controller	12,000	500	Aug 87	Dec 87	Dec 87
Terminal Controller	12,000	500	Aug 88	Dec 88	Dec 88
Memory-8MB	50,000	1,000	Aug 88	Dec 88	Dec 88
Disk Drive-3380	60,000	2,000	Aug 87	Dec 87	Dec 87
Disk Drive-3380	60,000	2,000	Aug 89	Dec 89	Dec 89
Total	$254,000	$7,200			
Communications & Networking					
Regional Centers	$12,000	$15,000	Aug 87	Dec 87	Mar 88
Plan-Consultant	10,000		Aug 87		
Wang Upgrade	70,000	7,000	Aug 88	Nov 88	Jun 89
Lanier Upgrade	70,000	7,000	Aug 89	Nov 89	Jun 90
Total	$165,000	$29,000			
Staffing					
Contract Programming		30,000	July87		
Total		$30,000			
Systems Software					
Security	$16,000	$2,000	Aug 87	Oct 87	Jan 88
Performance Monitor	20,000	2,000	Aug 88	Oct 88	Dec 88
VM Management	50,000	5,000	Aug 88	Oct 88	Jun 89
Data Base Tools	38,000	7,000	Aug 87	Oct 87	Nov 87
System Accounting	20,000	2,000	Aug 89	Oct 89	Jun 90
Data Base Administrator		35,000	Jul 87		
Total	$144,000	$53,000			
Centralized Maintenance					
(5) IBM PC - Spares	$10,000		Aug 87	Oct 87	Oct 87
(5) Printers - Spares	2,500		Aug 87	Oct 87	Oct 87
Setup Base Account		20,000	Jul 87		
Total	$12,500	$20,000			
Total	$624,500	$155,200			

Figure 64. Central Computing Budget Estimates and Time Frames

The total amount needed for Central Computing is $624,500 of capital funds and an increase of $155,200 in the operating budget. See the final section of the plan for a breakdown by fiscal year.

SUMMARY RECOMMENDATIONS AND FINANCIAL CONSIDERATIONS

Overview

This chapter provides summary recommendations and financial considerations for academic, administrative, and central computing for fiscal years 1988-1990. Included are sections summarizing the staffing needs, the total institutional financial considerations with various funding alternatives. See the individual sections of the plan for detail on the recommendations.

Academic Computing

Summary Recommendations

The following section provides a summary of the recommendations for Academic Computing. The recommendations are divided into student, faculty, and support areas.

Student

The following recommendations will improve student access to computers to meet the future demands in the instructional areas.

- **Expand computer lab resources.**

  Projections of student usage over the next three years warrant the expansion of current computing hardware resources. This is especially true of Intergraph, IBM PC, Plato and Unix based systems. Estimates of the number of additional stations that are needed include IBM PC (51), Plato (5), Intergraph (11), Unix (18) and Wang (3). It is also recommended that printers be purchased for the lab facilities.

- **Provide IBM PC compatible equipment.**

  We should investigate the use of IBM PC compatible equipment for use on campus. If compatibles can be used, the institution can save 20% on PC purchases. If compatibles are acceptable, only two to three types should be required.

- **Centralize student lab facilities.**

  Present space limitations have prevented the expansion of existing lab facilities to accommodate growth in the use of computers. The proposed microprocessing facility will allow for both the expansion and centralization of computing resources. Because of the many advantages that will result through the merging of existing lab facilities, it is recommended that as many lab facilities as possible be placed in the microprocessing facility. The centralized lab should be set up as a computer network to allow for distribution of software and central management and control.

- **Increase student access outside of lab facilities.**

  Student access to computers should be increased by providing additional microcomputers for loan to students through the LRC and lab facilities, increase the number of outside dial-up access lines, and provide additional portable or dedicated projection systems for use in the classrooms.

- **Shift toward multiuser work stations.**

  Recent trends indicate that academic hardware resources are moving in the direction of powerful multiuser work stations which are linked together and able to support a wide range of applications and operating systems. The college should shift towards this type of resource and begin to network these stations to the other systems at the college. The goal is to create a machine-transparent environment where every work station can act as an access point to every other computer system.

- **Expand computer resources in regional centers.**

  It is recommended that additional computer resources be placed at the Regional Centers. This includes terminals and microcomputers to access systems at the college.

- **Add terminals to the AT&T 3B5 system.**

  Recently an AT&T 3B5 system was donated by AT&T to the college. Not included in the donation were computer modems, terminals or printers. These peripherals need to be purchased for the Unix program.

- **Monitor system utilization.**

  Each computing lab should be monitored on a quarterly basis to collect usage data on the computer systems. This will provide accurate data on computer usage. We should find out how long and for what courses students are using the labs.

Faculty

The following recommendations will improve faculty access to computers and promote the growth of computer use thereby improving computer literacy on campus.

- **Provide faculty offices with microcomputers.**

  Provide faculty offices with microcomputers to be used in the preparation of course materials, management of instruction, instructor-student consultation concerning computer-related assignments, exploration of new applications, development of instructional software, network access to lab software and communications with other faculty or support staff. Specific requests include the purchase of 25 microcomputers, one to be placed in each faculty suite.

- **Provide a faculty work area.**

  As proposed by the Microprocessing Center Committee, a faculty work area is to be set up for course and program research or development. This area may be used to develop new course material, evaluate special equipment or the development of new applications.

- **Provide funding for the investigation of new computer technologies.**

  Money needs to be set aside for the purchase of new instructional/informational delivery systems (i.e. ROM Disk, interactive video, graphics, projection systems). A research and development fund under control of the Academic Computing Planning Committee should be made available to faculty and support staff for the development of new technology. Funding of these projects would be granted by the committee after review of a proposal and its impact on the related areas of instruction.

Software

The following recommendations relate to the management and growth of computer applications:

- **Involve more faculty in the search for instructional applications.**

  Leadership is needed in organizing those activities which promote the search for new applications. This includes those steps involved in identifying and integrating software into instruction. These include curricular evaluation and development, selection and preview of software, review of software purchase, integration of software into instruction and the lab facilities and the preparation of student support materials.

  Because faculty involvement is essential for the identification and evaluation of instructional applications incentives need to be provided which will encourge them to take an active role in the process. Some incentives include release-time, summer pay, the possibilities of royalties, funding of R & D projects and peer recognition for individual achievement.

- **Provide faculty with the tools needed to develop instructional software.**

  With the proper tools and incentive, faculty can develop instructional software which is tailor-made to the course they teach. Some of these tools include spreadsheets, data base and integrated software, templates for programming code for CAI and authoring languages. It is recommended that these tools be provided to faculty to encourage the development of software.

- **Establish a centralized software budget.**

  It is recommended that a college-wide software budget be established which will allow for the purchase of software as needed by the departments for faculty and students. At least two microcomputer lab facilities at the college are in need of additional copies of software so as to comply with copyright laws. This budget will not include current monies allocated in the operating budgets for software purchase at the college.

- **Maintain an inventory of software for the college.**

  As software is purchased, information will be collected for each item and added to a software data base. Students and faculty need to be notified of software that is available for their use.

- **Investigate and purchase public domain software.**

  In some instances Public Domain Software is the least expensive solution to an instructional software need. These items should be investigated and purchased.

- **Investigate site license purchase of software.**

  Purchase of software for faculty or lab areas through the license agreements can lower the cost/station and improve access to microcomputer software.

- **Standardize application and systems software.**

  When possible steps should be taken to adopt and promote standards for the various general-use programs such as word processing, data base, graphics, communications and operating systems software.

Support

The following recommendations will provide an adequate level of support to meet the future growth of academic computing.

- **Provide improved support for students.**

  Projections of future computer use indicate that additional lab aides will be needed over the next three years to compensate for doubling the hours of operation. It is recommended that

five lab aides be hired each year over the next three years. It is also recommended that students with high levels of computer expertise assume the role of student consultants and provide all additional services.

- **Establish a faculty-student support area.**

  It has been proposed that the microprocessing center contain two or three offices to be used by faculty for research and development activities and for individual consultation with students.

- **Establish a student support network.**

  Part of the computing knowledge network referenced in the faculty support section can be devoted to the support of student computer use. Each class can have access to an information account on the network which allows for communication with faculty, lab support staff and other Academic areas of the college. The student support network will improve communication between present areas of support and the increasing number of students using computers.

- **Establish a computing support and information network.**

  The computing support and information network will improve the support of computing on campus. It will consist of support staff as well as faculty who have achieved a level of expertise, provide for communication between the area or individual in need of assistance, bring together areas of support that are now distributed throughout the college and serve as a storage area and conduit for information which is considered part of the college's computing knowledge resources.

- **Continue staff development and computer training.**

  It is recommended that staff development and computer training activities continue to promote computer literacy at the college. Faculty need to be encouraged to attend these workshops.

- **Organize and distribute documentation.**

  It is essential to provide high quality documents which aid faculty in using computer resources and provide information that help in the investigation of new applications. This includes an index of computer hardware, software and computer expertise; lists of manuals and documents and where to find them; information about existing systems and applications; information about software resources; minutes of committee meetings and new projects that are currently in progress. It is recommended that a faculty or student guide to the college's computing resources be compiled and distributed.

- **Provide consulting on computer-related issues.**

  All computer support areas, including Computer Services, Instructional Design, the Learning Resource Center, the Regional Centers and the Instructional Divisions should continue to help faculty in the investigation of new applications, problems with hardware and software and the integration of computer use into class instruction. Individuals who support the larger computer systems need to make instructors aware of the potential use of these systems.

- **Provide faculty with programming support.**

  Faculty who want to use computers in instruction, but do not want to develop the applications themselves can define the specifications to programming staff who are responsible for writing the programs. Because of the success of this approach in the development of the Sabre system and Fitness Lab program, it is recommended that programming support be increased and provided to all faculty.

Financial Considerations

The following figure provides a breakdown of the computing costs of Academic Computing by fiscal year. The capital amounts are one-time funds. The operating budgets are the ongoing cost of supporting the equipment and software.

ACADEMIC COMPUTING

Item	FY1987-88 Budget Estimate Capital	FY1987-88 Budget Estimate Operating	FY1988-89 Budget Estimate Capital	FY1988-89 Budget Estimate Operating	FY1989-90 Budget Estimate Capital	FY1989-90 Budget Estimate Operating
Hardware Needs						
Lab Resources						
IBM PC	$48,000	$4,800	$51,000	$9,900	$54,000	$15,300
Plato					2,500	250
Multiplexer	5,000	500		500		500
Intergraph	65,000	6,500	65,000	13,000	50,000	18,000
MacIntosh	10,000	1,000	10,000	2,000	10,000	3,000
Unix	16,000	1,600	6,000	2,200	6,000	2,800
Wang					3,000	300
Printers	5,000	500	5,000	1,000	5,000	1,500
Microprocessing Center						
Network Servers	50,000	5,000	100,000	15,000		15,000
Power Backup			50,000	1,000		1,000
Outside Access						
IBM PC-Loan	6,000	600		600	4,000	1,000
7171 Expansion	5,000	500		500		500
Dialup Ports	5,000	1,000	5,000	2,000	5,000	3,000
Projection Systems	10,000	1,000		1,000		1,000
Regional Centers						
Davea-IBM PC's			30,000	3,000		3,000
Hinsdale PC's	29,500	2,900		2,900		2,900
Faculty Access-Faculty Suites						
Personal Computers	20,000	2,000	20,000	4,000	20,000	6,000
Faculty Work Area						
Personal Computer	6,000	600		600		600
Faculty Research		10,000		10,000		10,000
Software Needs						
Faculty Development		5,000		5,000		5,000
Public Domain Software		2,000		2,000		2,000
Central Software Budget		30,000		30,000		30,000
Lab Software	36,000					
Support Needs						
Staff Development						
Support Staff				30,000		30,000
Lab Aides				5,000		5,000
Total	$316,500	$75,500	$342,000	$141,200	$159,500	$157,650

Figure 65. Academic Computing Budget Summarized

The total capital amount requested for Academic Computing is $818,000 for FY1988-1990. The operating budget will need to increase by $75,500 in FY88, $141,200 in FY89 and $157,650 in FY90, to provide continuing support for the capital items.

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Administrative Computing

Summary Recommendations

The following section provides a summary of the recommendations for Administrative Computing. The recommendations are divided into major administrative systems, end user applications, and support needs.

Administrative Applications

The following recommendations set a direction for future development of administrative applications.

- **Purchase major administrative applications to run under the IDMS/R data base.**

  We are recommending the following large administrative applications be purchased externally from a vendor to run under the IDMS/R data base. This assumes that 80 percent of the institutional needs can be provided by a package. The following systems are requested:

  Business System - This includes a replacement general ledger, accounts payable, accounts receivable, and purchasing.

  Student System - This includes a replacement student registration and records, financial aid, and billing. This will also provide a new degree audit application.

  Voice Response System - This allows students to register via touch tone telephone without human interface.

  Management Information System - This provides a system that can generate management information for deans and directors for planning.

  Career Planning - This provides a system for the career office to work with students on planning.

- **Provide centralized office automation for the institution.**

  Set up a project using the IBM mainframe as the center for office automation. This system would include electronic mail, calendaring, conferencing and scheduling. This would be provided in two phases. Phase I would be a pilot project of IBM access users only. Phase II would incorporate Wang and Lanier users into the system.

- **Upgrade the library system.**

  Upgrade the present CLSI system with its revised system or replace with a totally new library system that would provide the needed features and modules.

- **Replace the current RSVP system.**

  Determine the feasibility of replacing the HP 3000 for RSVP by upgrading the HP or purchasing a replacement RSVP package for the IBM.

- **Develop or convert medium system applications in-house under IDMS/R or AS.**

  All new medium system applications are to be developed inhouse under IDMS/R data base or IBM AS application system using existing staff. Convert all existing medium system applications to IDMS/R or IBM AS using existing staff.

- **Base small applications on AS or IBM PC's.**

  All small applications should be developed with IBM AS or purchased to run on an IBM microcomputer system.

End User Applications

The following recommendations provide the necessary computing functions requested by the departments to meet end user application needs.

- **Encourage use of AS**

  Encourage use of IBM's Application System (AS) product and its capabilities through services and training sessions.

- **Provide users access to Application System with the proper equipment.**

  Acquire 12 additional graphics terminals for distribution to the administrative areas during the next three years. Provide central computing support for computer generated graphics from a high speed plotter.

- **Improve the print quality of reports generated by administrative offices.**

  Acquire five laser printers to distribute printing to major administrative users. The units would be purchased during the next three years. Replace existing IBM 3287 printers in departments where reports are generated to be distributed outside the college.

- **Provide word processing to the departments on campus requiring the capability.**

- **Provide personal computer software for downloading from the IBM mainframe.**

  Investigate personal computer download software and set up a pilot project to determine the applicability.

- **Provide electronic mail to all deoartments.**

Support

The following recommendations will provide the computer training necessary to improve computer literacy on campus:

- **Develop program/user seminars on computing.**

  Develop program/user seminars on computing as to what is happening today and how computing can be used effectively in a given department. Many current and potential computer users are not aware of what is available. Regular seminars will help eliminate this information gap and allow users to ask the right questions.

- **Incorporate computers into simple activities.**

  Incorporate computers into simple activities. Activities that should be promoted include wide use of electronic mail for simple messages, calendaring facilities and administrative schedules.

- **Use the computers that currently exist on campus to improve productivity.**

  Effectively utilize computers into daily activities. Such activities should include downloading data from the mainframe system into both AS and microcomputers for analysis and reporting, effective and wider use of word processing, and incorporating graphics for reporting and presentation.

- **Provide additional training, documentation and consulting assistance.**

  Hire four additional personnel for end user computing to provide support for training, documentation, and consulting

Financial Considerations

The following figure provides a breakdown of the computing costs for Administrative Computing by fiscal year. The capital amounts are one-time funds. The operating budget shows the ongoing cost of supporting the capital equipment and software.

ADMINISTRATIVE COMPUTING

Item	FY1987-88 Budget Estimate Capital	FY1987-88 Budget Estimate Operating	FY1988-89 Budget Estimate Capital	FY1988-89 Budget Estimate Operating	FY1989-90 Budget Estimate Capital	FY1989-90 Budget Estimate Operating
Administrative Software						
Business System	$290,000			$20,000		$20,000
Student System			225,000		75,000	25,000
(1) Support Staff				30,000		30,000
Consulting			50,000		50,000	
Library System	70,000	7,000		7,000	210,000	28,000
RSVP			50,000	5,000		5,000
Access to IBM-AS						
Upgrade Open Campus	14,000	500		500		500
Upgrade Central Campus	4,000	200		200		200
Graphics Terminals	3,000	200	3,000	400	3,000	600
Laser Printers	7,000	1,000	7,000	2,000	7,000	3,000
Term Interfaces	1,000	100		100		100
Down Load Software	20,000	2,000		2,000		2,000
End User Applications						
Terminals	15,000	1,500	10,000	2,500		2,500
Printers	10,000	1,000	7,500	1,750		1,750
Micros	60,000	2,000	66,000	4,000		4,000
Training Support						
(2) Support Staff				30,000		60,000
Consulting Support						
(2) Support Staff		30,000		30,000		60,000
Total	$494,000	$45,500	$418,500	$135,450	$345,000	$240,650

Figure 66. Administrative Computing Budget Summarized

The total requested amount for administrative computing is $1,280,500 for FY1988-1990. The operating budget will need to increase by $45,500 in FY88, $135,450 in FY89 and $240,650 in FY90 to provide the continuing support for the equipment and software.

Central Computing

Summary Recommendations

The following section provides a summary of the recommendations for Central Computing. The section is divided into governance, system software, operational and hardware recommendations.

Governance

The following governance changes will improve the organizational structure of computing:

- **Change "Computer Service" to "Computing and Information Technology."**

The name of the area "Computer Services" is no longer appropriate for the responsibilities assigned to Computer Services. The Computer Services department name should be changed to "Computing and Information Technology."

- **Change the department names within Computer Services to reflect the functions and support provided to the institution.**

  Change "Information Support Services" to "End User Support Services"

  Change "Academic Computing" to "Academic Support Services"

  Change "Computer Operations" to "Operational Support Services"

  Change "Administrative Systems" to "Administrative Support Services"

- **Change "ACPAC" to reflect advisory responsibilities.**

  Modify the current "Academic Computing Planning Committee" title to "Academic Computing Planning and Advisory Committee" ("ACPAC"). The Executive Director of Computer Services will serve on the committee to allow direct input from faculty to computing management.

- **Update the *Institutional Plan for Computing* on a yearly basis.**

  The *Institutional Plan for Computing* should be updated on a yearly basis. Each year an addendum will be generated for any changes, as an additional year is added. Every three years the plan will be completely revised.

System Software

The following recommendations provide a direction for mainframe operating system software:

- **Maintain the current IBM operating system**

  Retain current operating system environment of VSE, VM and MUSIC while monitoring technology and evaluate on a yearly basis.

- **Provide a system accounting package.**

  Analyze the available products for VM/SP and VSE/SP online in order to provide an institutional charge back system.

- **Provide data base management tools.**

  We are recommending the acquisition of data base management tools to provide efficient utilization of IDMS/R. The system will provide tremendous time savings and improve data integrity.

- **Provide system management software for VM.**

  We are recommending the acquisition of VM management software to provide a solution to the control and management of the VM operating system. The software will provide system security, disk management, data integrity, workload balancing, operational efficiency and management reporting.

- **Provide an improved security system on the IBM mainframe.**

  Acquire a security package flexible and easy to manage that will work with our current VSE environment and provide resource security on disk and tape files.

- **Provide additional support for the IDMS/R data base.**

  We need to add one additional person to support the IDMS/R data base.

Operations

- **Expand computer room facilities.**

  Upon completion of the microprocessing center and movement of the IBM mainframe terminal lab, utilize the current terminal lab area as an expansion of the existing computer room.

- **Remodel the computer room.**

  Review current floor plans and provide a solution to equipment expansion. Construction funds may be needed to remodel this area to meet our needs within three years.

- **Expand hours of computer operations.**

  Add a computer operator to expand operation hours to 24 hours per day, 7 days per week.

- **Provide a power backup system for the IBM mainframe.**

Support

The following recommendations will provide stability and continuity in support of computing on campus:

- **Maintain equitable salary levels.**

  Continue to monitor salary levels in the Chicago area and make adjustments according to demand.

- **Provide sufficient funding for training.**

- **Use contract programmers.**

  Allocate additional funds for contract programming to meet the application needs of the institution.

Hardware

The following recommendations will provide the necessary hardware to support the predicted application growth:

- **Expand terminal access.**

  Provide two 3274 controllers, one in 1988 and one in 1989 to provide additional ports for end user terminals and microcomputers.

- **Expand memory to improve user response.**

  Provide eight additional megabytes of memory for the IBM 4381 in 1989.

- **Upgrade the IBM CPU to provide faster access and greater throughput.**

  Provide a CPU upgrade from a Model P1 to P13 in 1988.

- **Expand disk space to support future and current applications.**

  Provide two IBM 3880 disk drives, one in 1988 and one in 1990.

Centralized Maintenance

- **Provide centralized maintenance for microcomputers.**

  We recommend that a centralized mechanism for controlling and managing the hardware

maintenance and repair of all institutional microcomputers be established. This mechanism includes a computerized tracking and reporting system to analyze and evaluate maintenance policies and procedures. Computer Services will be responsible for administering this system.

Communications and Networking

The following recommendations provide a direction for integrating computer systems on campus.

- **Use the IBM mainframe as the central distribution system for connectivity.**

  The IBM mainframe must be the central distribution system for connectivity. This means that all current computer systems that need to access the IBM must adhere to IBM communications standards.

- **Upgrade Wang System**

  Upgrade the Wang system to a newer technology system VS85 or equivalent to allow document exchange with the IBM system.

- **Upgrade/Replace Lanier System**

  Upgrade or replace the Lanier system in Open Campus for all individuals needing access to the IBM system.

- **Network the computer systems on campus.**

  Any new or current computer systems that need access to the IBM must adhere to the IBM communications standards. This includes the expansion of microcomputers in faculty suites and the new microprocessing center.

- **Provide high speed access to regional centers.**

  The three regional centers need high speed access to the central campus just to perform current administrative functions. Each center currently has dial-up access which causes problems in response time and data transmission. Each location will need a dedicated four wire full duplex leased line and four channel modems.

- **Develop a plan for telecommunications.**

  A plan for telecommunications to connect central campus, open campus and the regional centers must be developed to provide a communications network that allows connectivity of computer systems and the continuing support of the system. The proposal should provide a cabling system that would support voice, video and data to be transmitted over the same line.

Financial Considerations

The following figure provides a breakdown of computing costs for Central Computing by fiscal year. The capital amounts are one-time funds. The operating budget is the ongoing cost of supporting the equipment and software.

CENTRAL COMPUTING

Item	FY1987-88 Budget Estimate Capital	FY1987-88 Budget Estimate Operating	FY1988-89 Budget Estimate Capital	FY1988-89 Budget Estimate Operating	FY1989-90 Budget Estimate Capital	FY1989-90 Budget Estimate Operating
Electrical Power						
UPS	$52,000	$1,000		$1,000		$1,000
Computer Operator				15,000		15,000
IBM Mainframe						
Disk Drive-3380	60,000	2,000		2,000	$60,000	4,000
CPU - Upgrade	60,000	1,200		1,200		1,200
Terminal Controller	12,000	500	$12,000	1,000		1,000
Memory-8MG			50,000	1,000		1,000
Networking						
Regional Centers	12,000	15,000		15,000		15,000
Wang Upgrade			70,000	7,000		7,000
Lanier Upgrade					70,000	7,000
Plan Consultant	10,000					
Systems Software						
Accounting					20,000	2,000
Performance Monitor			20,000	2,000		2,000
Control Management			50,000	5,000		5,000
Security	16,000	2,000		2,000		2,000
Data Base Tools	38,000	7,000		7,000		7,000
Data Base Adminstrator		35,000		35,000		35,000
Staffing						
Contract Programming		30,000		30,000		30,000
Centralized Maintenance						
IBM PC Spares	10,000					
Printers Spares	2,500					
System Base Account		20,000		20,000		20,000
Total	$272,500	$113,700	$202,000	$144,200	$150,000	$155,200

Figure 67. Central Computing Budget Summarized

The total capital amount requested for central computing is $624,500 for FY1988-1990. The operating budget will need to increase by $113,700 in FY88, $144,200 in FY89, and $155,200 in FY90 to provide the necessary support for the hardware and software.

Support - Summarized

In the plan we have requested several additional positions to provide the level of support we feel we need in computing. Many of the positions deal directly with training the user "how to" while providing the continued support of hardware and software. The following figure shows the current staffing levels with the additional positions requested and where the positions are needed.

COMPUTER SERVICES
STAFFING LEVEL REQUEST

	Fiscal Year/No. of Positions				
Department/New Position	*1987*	*1988*	*1989*	*1990*	*Total*
Office of Director	3	0	0	0	3
Administrative Systems	9	0	0	0	9
Programmer Analyst	0	0	1	0	1
Academic Computing	4	0	0	0	4
Programmer Analyst	0	0	1	0	1
Computer Operations	7	0	0	0	7
Operator	0	0	1	0	1
Information Support Services	3	0	0	0	3
Training/Documentation Specialist	0	0	1	1	2
Information Center Analyst	0	1	0	1	2
Technical Support Services	3	0	0	0	3
Data Base Administrator	0	1	0	0	1
Total No. of Positions	29	2	4	2	37

Figure 68. Computer Services Staffing Level Request

The following new positions are requested:

- Programmer Analyst position in Administrative Systems will work on the implementation of the Student System.
- Programmer Analyst position in Academic Computing will provide microcomputer training and support to faculty.
- Computer Operator position will allow Computer Operations to expand production 24 hours per day, seven days per week.
- Two Training/Documentation Specialist positions in Information Support Services will provide end user training, use of computers and documentation.
- Information Center Analyst will provide support for decision support tools, microcomputers, and end user applications.
- Data Base Administrator in Technical Support Services will provide the main data base support for IDMS/R.

We are requesting two additional positions in FY 1988, four positions in FY 1989 and two positions in FY 1990.

Institutional Financial Considerations

Summary of Financial Considerations

The total requested funds for capital expenditures for FY1988 to FY1990 is $2,700,000. In order to provide an adequate level of staff support and maintenance to support the capital expenditure the operating budget will need to increase by $234,700 in FY88, $420,850 in FY89 and $555,500 in FY90. The following figure shows a summary of the financial consideration for academic, administrative, and central computing.

INSTITUTIONAL FINANCIAL CONSIDERATIONS

Item	*FY1987-88 Budget Estimate*		*FY1988-89 Budget Estimate*		*FY1989-90 Budget Estimate*	
	Capital	*Operating*	*Capital*	*Operating*	*Capital*	*Operating*
Academic Computing	$316,500	$75,500	$342,000	$141,200	$159,500	$157,650
Administrative Computing	494,000	45,500	418,500	135,450	345,000	242,650
Central Computing	272,500	113,700	202,000	144,200	150,000	155,200
Total	$1,083,000	$234,700	$962,500	$420,850	$654,500	$555,500

Figure 69. Institutional Financial Considerations

Funding Alternatives

There are several methods that can be used to provide the partial or full funding necessary to provide money for the plan.

- Lab fees
- Capital funds
- Joint partnerships with private corporations
- Educational discounts
- Grants and donations
- Long term financing

Lab Fees

Currently the college has a computing lab fee of $5 per course for all computer courses in the data processing curriculum that use computers. As more divisions use computing in their curriculum they should also be assessed a lab fee. Several courses in other divisions use computers more than the data processing area.

The current fee is $5 per course. Lab fees at other institutions range up to $15 per course. We should consider increasing our current lab fee. Another option would be to charge a single charge per quarter for use of the lab facilities.

If we were to increase the current lab fee to $10 per quarter and charge all computer users a fee, with the current usage, we could generate up to $300,000 per year. If student usage increases as projected, the revenue generated from lab fees could generate up to $500,000 per year.

Capital Funds

Capital funds could be allocated from the institutional budget each year to cover the capital cost items.

Joint Partnerships

Many colleges and universities have developed joint partnerships with corporations in providing hardware and software. Most of the joint partnerships require a commitment from the institution or people resources to assist in the development of software.

Some joint partnerships require the institution to be a show place for the vendor product. The institution would provide seminars and tours on what is happening. This also requires people support from the institution.

The savings from a partnership could provide a discount from 5 to 50 percent on the products.

Educational Discounts/State Contracts

Most vendors provide discount programs for higher education. Depending on the volume, discounts can range from 5 to 40 percent off list price. Since we are part of the state higher educational system we can use the state computer contracts that have been set up by other colleges and universities.

Grants and Donations

Grants and donations are other approaches that can be used to provide computer hardware and software. The college has successfully received grants to cover high technology advancements.

Donations can provide some hardware but most of the time the equipment donated is older technology which could require substantial funds to maintain.

Long Term Financing

We have used long term financing over the last several years to provide funds for computing. If capital funds are not available, long term financing may be the approach we want to use for some of the funding. The current loan rates are very low.

In order to fund computing, we will need to use several of the funding options available to meet our needs.

Financial Plan

A financial plan is one of the most important components of a planning effort. Diligent and careful financial planning is important to reduce costs and save money for the institution. This section defines the spending levels for computing over the last four years FY84 - FY87; provides budget estimates for FY88 - FY92; describes the effects of computing on the unit cost per student; and identifies the funding sources to meet the estimated computing expenditures for FY88 - FY92.

The following table shows a comparison of Computer Services actual expenditures for fiscal years 84, 85, 86; the current budget for FY87; and the estimated budget for FY88, which is the first year of the computing plan. The table includes both expenditures and budgets from Computer Services operating account 197 and the current long range computer account 697.

COMPUTER SERVICES
ACTUAL EXPENDITURES VS. ESTIMATED BUDGET
FY84 - FY88

	Actual Expenditures			Estimated Budget	
	1983-84	1984-85	1985-86	1986-87	1987-88
Salaries	$ 518,813	$ 570,535	$ 708,312	$ 830,037	$ 968,216
Fringe Benefits	42,769	44,634	59,199	81,952	89,813
Contractual Services	186,152	207,518	289,051	394,288	580,124
Supplies	94,081	66,195	51,244	89,488	93,334
Conference & Meeting	5,317	8,854	23,731	21,441	22,756
Fixed Charges	321,945	834,643	317,378	335,802	338,774
Telephone	7,476	7,532	10,251	11,000	11,500
Other	31,399	7,076	11,399	8,856	13,726
Subtotal	$1,207,952	$1,746,987	$1,470,565	$1,772,864	$2,118,243
Capital Outlay	146,564	530,697	461,140	318,290	973,170
Total	$1,354,516	$2,277,684	$1,931,705	$2,091,154	$3,091,413

Figure 70. Actual Expenditures vs. Estimated Budget FY84 - FY88

The level of expenditures will increase by 20% or $346,000 in the operating budget and $655,000 for capital outlay from FY87 to FY88. The majority of the increase in the operating budget are for salaries, $138,000, and contractual services, $186,000. Contractual Services includes the maintenance for hardware and software.

Figure 2 compares the current Institutional Financial Long Range Plan with the Institutional Plan for Computing and defines the additional funds that must be generated to fund the computing plan through FY92.

FUNDING
FINANCIAL LRP VS. INSTITUTIONAL PLAN FOR COMPUTING
FY88 -FY92

	Financial LRP	Institutional Plan For Computing			Fiscal Year	
	1987-88	1987-88	1988-89	1989-90	1990-91	1991-92
Salaries	$ 968,216	$ 968,216	$1,137,641	$1,285,971	$1,363,128	$1,444,915
Fringe Benefits	89,813	89,813	113,764	128,597	136,313	144,492
Contractual Services	329,372	580,124	640,222	714,872	700,147	666,186
Supplies	93,962	93,334	91,539	96,116	100,922	105,968
Conference & Meeting	22,513	22,756	23,639	24,821	26,062	27,365
Fixed Charges	352,592	338,774	355,085	358,505	249,255	164,721
Telephone	11,550	11,500	11,550	12,128	12,734	13,371
Other	9,300	13,726	7,490	7,865	8,258	8,671
Subtotal	$1,877,318	$2,118,243	$2,380,930	$2,628,875	$2,596,819	$2,575,698
Capital Outlay	540,835	973,170	912,500	604,500	400,000	300,000
Total - Computing	$2,418,153	$3,091,413	$3,293,430	$3,233,375	$2,996,819	$2,875,689
Financial LRP	$2,418,153	$2,418,153	$2,692,721	$2,567,649	$2,588,225	$2,715,561
Funds To Be Generated	$ 0	$ 673,260	$ 600,709	$ 665,726	$ 408,594	$ 160,128

Figure 71. Funding Financial LRP vs. Institutional Plan for Computing

The first column of the table defines the Institutional Financial Long Range Plan budget estimates for computing in FY88. Columns 2 thru 4 show the budget estimates from the Institutional Plan for Computing. The last two columns, FY91 and FY92, are based on the continuing effect of the computing plan on the operating budget and funds identified in the Financial LRP for capital outlay of $400,000 in FY91 and $300,000 in FY92.

The Total - Computing row is the total dollars needed each fiscal year to fund the computing plan, e.g., $3,091,413 for FY88. The next to last row defines the funding that is included in the Financial Long Range Plan for computing. The last row identifies the funds that must be generated to fund the computing plan in addition to funds already included in the Financial Long Range Plan. These amounts were determined by subtracting the funds in the Financial Long Range Plan from the total needs for computing. In FY88, an additional $673,260 would be needed to fund the items requested in the computing plan. In FY89 we would need $600,709; in FY90, $665,726; in FY91, $408,594; and in FY92, $160,128.

The following three figures provide different options for funding the plan. Each figure identifies the sources for the Funds to be Generated line item of Figure 2.

INSTITUTIONAL PLAN FOR COMPUTING
FUNDING SOURCES

	1987-88	1988-89	1989-90	1990-91	1991-92
New Student Computing Fees	$ 0	$325,000	$350,000	$375,000	$400,000
1984 LRP Computer Balance	38,260	43,740			
Department Budgets	85,000	83,500			
Other Operating Funds				167,423	(113,053)
1986-87 Transfer from Operating	550,000				
Loan Proceeds		158,790	380,472	0	0
Loan Payment Principal			(31,758)	(107,852)	(107,852)
Loan Payment Interest		(10,321)	(32,988)	(25,977)	(18,967)
Total	$673,260	$600,709	$665,726	$408,594	$160,128
Loan Principal Balance		$158,790	$507,504	$399,652	$291,800

Figure 72. Funding Sources - Option 1

The sources of funds include a new student computing fee, the 1984 Long Range Computing Plan account balance, departmental budgeted funds, other operating funds, 1986-87 transfer from operating funds and loans. Sufficient funds exist in current accounts to fund the first year of the computing plan. In subsequent years if funds are not available, we would need to set up a computing fee for students and/or finance the remaining funding for FY89 - FY92. Our preliminary analysis of a student computing fee shows we should be able to generate the amounts defined in the table.

With the funds available each year, including the student computing fee, we would only need to borrow $158,790 in FY89 and $380,472 in FY90. The loans were computed at 6.5% annual interest over 5 years. The loans would spread the cost from FY89 through FY94. The Total row shows the amount of funds that could be gencrated for each fiscal year. These amounts match the funds to be generated in Figure 2.

The following figure represents option 2. The funds that were identified as loans in the previous table have been combined with other operating funds. Using the current projections in the Financial Long Range Plan with the tax assessment increase and student enrollment projections, adequate funds should be available. This option requires a student computing fee.

INSTITUTIONAL PLAN FOR COMPUTING
FUNDING SOURCES

	1987-88	1988-89	1989-90	1990-91	1991-92
New Student Computing Fees	$ 0	$325,000	$350,000	$375,000	$400,000
1984 LRP Computer Balance	38,260	43,740			
Department Budgets	85,000	83,500			
Other Operating Funds		148,469	315,726	33,594	(239,872)
1986-87 Transfer from Operating	550,000				
Total	$673,260	$600,709	$665,726	$408,594	$160,128

Figure 73. Funding Sources - Option 2

The following figure represents option 3. The funds that were identified as student computing fees were combined with other operating funds. This option would eliminate the need for a student

computing fee. We would need to allocate additional funds from the operating budget to cover the funding needs.

INSTITUTIONAL PLAN FOR COMPUTING
FUNDING SOURCES

	1987-88	1988-89	1989-90	1990-91	1991-92
1984 LRP Computer Balance	38,260	43,740			
Department Budgets	85,000	83,500			
Other Operating Funds		473,469	665,726	408,594	160,128
1986-87 Transfer from Operating	550,000				
Total	$673,260	$600,709	$665,726	$408,594	$160,128

Figure 74. Funding Sources - Option 3

The following table shows a comparison of the unit cost analysis for Actual FY84 - FY87 and the projected unit cost for FY88 - FY92 based on the funding of the Institutional Plan for Computing. The table shows the actual student FTE's for FY84 - 86 and the budgeted FTE's through FY92. The unit cost is the total dollars spent per student FTE at the college for instructional and administrative computing.

UNIT COST ANALYSIS
ACTUAL VS. PROJECTED
FY84-89

	Actuals			Budget		Institutional Plan For Computing			
	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92
Student FTE	11,812	11,072	11,210	11,689	11,806	11,924	12,043	12,164	12,285
Unit Cost	$3.82	$6.86	$5.74	$5.96	$8.73	$9.21	$8.95	$8.21	$7.80
Instr Unit Cost	0.96	1.71	1.44	1.49	2.18	2.30	2.24	2.05	1.95
Admin Unit Cost	2.87	5.14	4.31	4.47	6.55	6.91	6.71	6.16	5.85

Figure 75. Unit Cost Analysis Actual vs. Projected FY84 - 89

The current unit cost for computing in FY87 is $5.96. This is divided into $1.49 for Instructional Computing, and $4.47 for Administrative Computing. The unit cost will increase to a high of $9.21 in FY89, and then decrease each year to $7.80 by FY92. For state reporting, the administrative computing unit cost is identified separately.

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Appendix A. ACADEMIC COMPUTING SURVEY

The following pages contain the Academic Computing Survey used to gather faculty input to the academic portion of the plan for computing.

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ACADEMIC COMPUTING SURVEY
FACULTY INPUT TO THE ACADEMIC COMPUTING PLAN

Return to SRC 2005C by June 7, 1985

Name **Area of Instruction**

Name of Department/Division

HARDWARE

I. List from highest to lowest priority where you would like to see an increase in computer hardware

Enter a number from 1 through 11 with 1 being the highest Priority and 11 the lowest priority.

_____ Plato Terminals
_____ IBM 4381 Terminals
_____ HP 3000 Terminals
_____ Wang Terminals
_____ Tektronix Terminals
_____ IBM PC Lab Microcomputers
_____ Apple IIe Lab Microcomputers
_____ TRS 80 Lab Microcomputers
_____ Unix C Lab Stations
_____ Victor 9000 Microcomputers
_____ Other (please specify)_____

Enter a number from 1 through 8 with 1 being the highest priority and 8 the lowest priority.

_____ Hard Disk Storage
_____ Floppy Disk Drives
_____ Dot-Matrix Printers
_____ Letter Quality Printers
_____ Modems/Communications
_____ Dial-up to IBM 4381
_____ Local Area Network of Micros
_____ Other (please specify)
_____

II. List your priority for those areas where you would like to see an increase in number of computer stations. Enter a number from 1 through 6 with 1 being the highest priority and 6 the lowest priority

_____ Computer labs (All Micro's, Mini's, Mainframe, Plato).

_____ Microcomputers located in faculty office areas.
_____ Microcomputers located in centralized area for faculty use.
_____ Portable microcomputer projection system for classroom use.
_____ Fixed microcomputer projection system for classroom use.
_____ Other (please specify)_____

III. If your computer needs are not met by the computer types listed above, but instead require equipment which is highly specific to a computer application that you need to use, please describe the hardware below.

_____

_____

_____

SOFTWARE

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I. List your priority for those computer applications which are most important to you. Enter a number from 1 through 13 with 1 being the highest priority and 13 the lowest priority.

_____ Word Processing
_____ Plato-Computer Assisted Instruction
_____ Micro-Computer Assisted Instruction
_____ Micro-Class Management Software
_____ Micro-Database (i.e. PFS File, DB III)
_____ Micro/Mainframe-Graphics, Computer Aided Design
_____ Integrated Software (i.e Framework, Apple Works, Symphony
_____ Authoring Languages (used to create CAI programs without using Basic or Pascal)
_____ Statistical Programs
_____ IBM 4381 Languages/Tools
_____ IBM 4381 Database-Fourth Generation Language
_____ Communications Programs (Micro to Mainframe
_____ Other (please specify)_____

II. How would you rate your ability to obtain monies to purchase software? Please check one of the following choices.

_____ Excellent _____ Good _____ Adequate _____ Poor _____ Not Applicable

III. How would you rate your ability to identify and use software already purchased by the college? Please check one of the following choices.
_____ Excellent _____ Good _____ Adequate _____ Poor _____ Not Applicable

IV. How would you rate your ability to identify and use software not yet purchased by the college but available on the market.

_____ Excellent _____ Good _____ Adequate _____ Poor _____ Not Applicable

SUPPORT IN USE OF COMPUTERS

I. Please circle the level of support you feel you need to help you make use of computers.

	Level of Support				
	High	Moderate	Low	None	Does Not Apply
A. Computer training	A	B	C	D	E
B. Information on what is available at the college and how to use it.	A	B	C	D	E
C. Personal consulting on the use of hardware or software	A	B	C	D	E
D. Identification of new applications or evaluation of software	A	B	C	D	E
E. Integration of software into instruction	A	B	C	D	E

F. Written instruction on how to use software or hardware.	A	B	C	D	E
G. Demonstration of purchased software.	A	B	C	D	E
H. Installation and repair of microcomputers	A	B	C	D	E
I. Computer Programming in the development of instructional programs.	A	B	C	D	E
J. Student support in the use of a computer lab facility.	A	B	C	D	E

LEVEL OF SERVICE

I. Please circle the level of support you feel you are receiving.

	Level of Support				
	Exceed	Meet	Below	Unaccept	No Opinion
A. Is prompt in complying with requests.	A	B	C	D	E
B. Is courteous and polite.s	A	B	C	D	E
C. Is cooperative and helpful in solving problems/offering suggestions.	A	B	C	D	E
D. Is open to new ideas.	A	B	C	D	E
E. Tries to understand my needs.	A	B	C	D	E
F. Is well organized/efficient.	A	B	C	D	E
G. Is open to constructive criticism.	A	B	C	D	E
H. Is creative/original	A	B	C	D	E
I. Adjusts to change in service requests and deadlines.	A	B	C	D	E
J. Communicates available services.	A	B	C	D	E
K. Consistently produces desired results.	A	B	C	D	E
L. Demonstrates through knowledge of job duties/skills/procedures.	A	B	C	D	E
M. Consistently remains ahead	A	B	C	D	E

	of schedule and meets deadlines.					
N.	Makes fair, objective and consistent decisions.	A	B	C	D	E
O.	Demonstrates a willingness and openness to learn from the experience of others.	A	B	C	D	E
P.	Overall appraisal of services.	A	B	C	D	E

II. If there was one area of concern that could be improved, what problem would it be?

_____

_____

_____

_____

III. Please provide any comments or suggestions on improvement of services.

_____

_____

_____

_____

RESOURCE ALLOCATION

I. Assume you have been given responsibility to describe how computer resources are to be allocated at the college. You have been given a total of 1000 points which represents all of the resources that are available and must divide the points into categories listed below. You may allocate no points to any of the categories but do not exceed the total of 21000. Those categories you do not understand please leave blank.

Area	Number of Points Allocated
A. Word Processing - microcomputers	_____
B. Word Processing - mainframe	_____
C. Computer Graphics - microcomputers	_____
D. Computer Graphics - mainframe	_____
E. Statistical Software (i.e. SPSS, SAS)	_____
F. Language Compilers (PL/1, Fortran, Cobol, C)	_____
G. Computer-Aided Design (CAD/CAM)	_____
H. Computer-Aided Instruction (Plato)	_____
I. Computer-Managed Instruction (RSVP, Grading)	_____
J. Disk Data Set Security	_____

K. Account Security _____

L. Micro-Mainframe File Transfer _____

M. Full-Screen Access to Mainframe (MUSIC) _____

N. Additional Micro-Labs-Apple II _____

O. Additional Micro-Labs-Radio Shack _____

P. Additional Micro-Labs-IBM PC _____

Q. Access to UNIX _____

R. Timesharing Response Time _____

S. Increased Documentation _____

T. Improved Response to Problems _____

U. Increased Consulting _____

V. Microcomputer Support (Hardware, Software) _____

W. Micro-Networking Capability _____

X. Dial-up Access to the Mainframe _____

Y. Computer Training _____

Z. Other _____ _____

_____

_____

_____

_____

Incentive To Use Computers

I. It is realized that student use of computers can only increase through the effort of faculty in exploring new applications. Below are a number of ways we feel faculty will be encouraged to use computers. Please check off all items you feel are important and add additional incentives that will encourage your use of computers.

____ Faculty training workshops

____ Hardware or software grant to incorporate computer use in your classroom instruction.

____ Release time to explore, develop and incorporate computer use in your classroom instruction.

____ Other (please specify)_____

_____

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Appendix B. ADMINISTRATIVE USERS SURVEY

The following pages contain the Administrative Users Survey used to gather input to the plan from administrative users at the college.

June 3rd, 1987

COLLEGE OF DUPAGE
INSTITUTIONAL PLAN OF COMPUTING
ADMINISTRATIVE USERS SURVEY

Name: _____ **Title:** _____

Room Number: _____ **Building:** _____

Part Time Employee: _____ **Department:** _____

Full Time Employee: _____

I. EQUIPMENT USED

A. Terminal Usage

1. This section is to be completed only by those individuals who use a terminal. If you do not use a terminal check 'NO' for the first question and skip to Section I-Part B

   a. If you use a terminal, what is its make/model?

   b. Do you use a terminal? YES ____ NO ____

   _____

   c. Where is the terminal located? Building:_____ Room No. _____

   d. Do you share the terminal with other users? YES ____ NO ____

   e. How would you rate your access to the use of a terminal?

      ____ A terminal is always available.

      ____ A terminal is usually available only part of the time.

      ____ A terminal is rarely available.

   f. On the average how many hours a week do you use the terminals? ____ Hrs

B. Microcomputer Usage

YES ____ NO ____

This section is to be completed only by those individuals who use a microcomputer. If you do not use a microcomputer check 'NO' for the first question and skip to Section II-Part A.

1. Do you use a microcomputer? YES ____ NO ____

2. If you use a microcomputer, what is its make/model?

   _____

3. Where is the microcomputer located? Room No:____

4. Can your microcomputer communicate with the IBM 4381 mainframe computers? comput .sp 1

YES ____ NO ____

5. How would you rate your access to the use of a microcomputer?

____ The microcomputer is always available.

____ The microcomputer is available only part of the time.

____ The microcomputer is rarely available.

6. On average how many hours a week do you use the microcomputer?

_____ Hrs.

II. MAINFRAME ACCESS

A. Online Terminal/Microcomputer Access to the Mainframe

This section is to be completed only by those individuals who access the IBM 4381 mainframe computer system. If you do not use the mainframe, skip to Section III.

1. How often do you use a terminal to access mainframe data?

multiple times daily ____ once a day ____ once a week ____

multiple times weekly ____ less than once per week ____

2. How many hours per week do you spend using a terminal or microcomputer connected to the mainframe?

_____ Hrs

B. Online Response Time

1. Please indicate the average amount of time you must wait before receiving a response after you hit the enter key on your terminal.

less than two seconds ____ two to five seconds ____ six to ten seconds ____

eleven to thirty seconds ____ greater than thirty seconds ____

2. Please enter the response time that you consider acceptable for your online terminal usage.

____ seconds

III. COMPUTER APPLICATIONS USED

For sections A, B, C: if you use an application that is not listed below, enter its name in the 'OTHER' category.

A. Mainframe-based systems accessed online through a terminal/ microcomputer.

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For each of the online applications listed below for which you are authorized to use, please check off those items that you currently use and/or need training.

	Usage	Training Desired
General Accounting System (CLAS/GLS)		
Budgeting	____	____
Accounts Payable	____	____
Purchase Order	____	____
Chart of Accounts	____	____
Journal Entry/Cash Receipts	____	____
Fixed Assets Inventory System (INVS)	____	____
EZ-List (Mailing List System)	____	____
Student Financial Aid System (CDAS/FA)	____	____
Student Billing and Receivables (CDAS/BR)		
Cashier Functions (Screens 3-6, 11-14)	____	____
Schedule/Bills (Screen 4)	____	____
Subcode Maintenance (Screens 7,8)	____	____
Student Records System (CDAS/SR)		
Course Maintenance (Screens 41-49)	____	____
Quarterly Class Schedule Maintenance (Screen 50-59)	____	____
Student Registration (Screens 1-13)	____	____
Student Transcripts (Screens 29-30)	____	____
CMS (Conversational Monitor System)	____	____
Script	____	____
Menu System	____	____
Application System (AS)	____	____
Panvalet Editor	____	____
Library System (CLSI)	____	____
Other _____		____

B. Mainframe-Based Applications Accessed Through a Batch Process

For each batch application listed below, check off those items for which you are authorized to use, that you currently use and/or need training for. (A batch application is used to produce a printed report that is provided by Computer Services).

	Usage	Training Desired
College of DuPage Administrative Systems (CDAS)		
Student Financial Aid (FAS)	____	____
Billings/Receivables System (BRS)	____	____
Student Records System (SRS)		
Grade Processing	____	____
ICCB State Reporting	____	____

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General Ledger System (GLS)	____	____
Management Information System (MIS)	____	____
Financial Aid Billing	____	____
Payroll System (DUP)	____	____
Fixed Assets Inventory System (MSG)	____	____
Mailing List System (EZ-List)	____	____
Periodicals Systems Programs	____	____
LRC-CLSI Dump Titles	____	____
Other _____		____

C. Microcomputer-Based Applications

For each of the microcomputer software applications listed below, please check off those items that you currently use and/or need training for.

WORD PROCESSING

These programs are used to enter text, edit text and produce draft and letter quality documents.

	Usage	Training Desired
Displaywrite II	____	____
Displaywrite III	____	____
Wordstar	____	____
Multimate	____	____
Word Perfect	____	____
PFS Write	____	____
Microsoft Word	____	____
Other _____		____

SPREADSHEETS

These programs are used to enter numerical data into a grid which allows for calculation between fields of information.

	Usage	Training Desired
LOTUS 1-2-3	____	____
Multiplan	____	____
Visicalc	____	____
PFS Plan/Planning Assistant	____	____
Other _____		____

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FILE MANAGEMENT/DATA BASE MANAGEMENT

These programs are used to enter, file, edit, and retrieve data, and produce reports using the created files.

	Usage	Training Desired
DBASE II	____	____
DBASE III	____	____
RBase	____	____
PFS File	____	____
Other _____	____	____

GRAPHICS

These programs are used to produce bar charts, line charts, pie charts and other picture-representation of line or point data.

	Usage	Training Desired
Graphit	____	____
Eazygraph	____	____
Chartmaster	____	____
PC Draw	____	____
PFS Graph	____	____
Other _____	____	____

INTEGRATED SOFTWARE

Integrated software contains word processing, database, spreadsheet and often graphics and/or communications capability in the same program. The data contained in one of these sub-programs can be moved to another sub-program for processing.

	Usage	Training Desired
Symphony	____	____
Reflex	____	____
Framework	____	____
Smart	____	____
Deskview	____	____
Other _____	____	____

UTILITIES/SPECIALTY

These programs are not applications such as databases or spreadsheets but instead are directly involved with the daily use and control of the computer and its resources.

	Usage	Training Desired
Sidekick	____	____
Crosstalk	____	____
Fixed Disk Organizer	____	____
Other _____	____	____

IV. EVALUATION OF SERVICES USED

Below is a list of services which are provided to the college by Computer Services. Please select one of the following choices to show that you use the service and also help us to evaluate how the service or activity was performed. If you do not use the service, please select code 6 or 7.

1. Excellent 2. Very Good 3. Good 4. Poor
5. Very Poor 6. Do not use this service
7. Do not currently use the service but plan to in the future.

A. Computer Hardware and Software

Review and evaluation of proposed computer hardware purchases ____

Review and evaluation of proposed computer software purchases ____

Other _____ ____

B. Computer Maintenance and Repair

Microcomputer hardware maintenance ____

Maintenance of mainframe terminals, printers and communication hardware ____

Other _____ ____

C. Computer Training

Training in the use of computer hardware ____

Training in the use of computer software ____

Other _____ ____

D. Program Discrepancies

Resolution of program/discrepancies that are identified for Financial Aid. ____

Resolution of program/discrepancies that are identified for Student Records. ____

Resolution of program/discrepancies that are identified for General Ledger. ____

Resolution of program/discrepancies that are identified for Payroll processing. ____

Resolution of program/discrepancies that are identified for Billing/Receivables. ____

Other Discrepancies_____ ____

E. Other User Support

Installation and setup of microcomputers ____

Installation of terminals and printers ____

Installation of microcomputer software ____

Trouble-shooting and problem solving in the use of microcomputers ____

Trouble-shooting and problem solving in the use of terminals and printers ____

Assistance in the use of administrative computer applications ____

Support of changes for existing applications ____

Support in the development of new applications ____

Online system response time ____

Availability of online systems ____

Scheduling and processing of report requests ____

Distribution of reports ____

Data entry ____

Notification of scheduled computer system down-time ____

Other _____ ____

For those services rated poor or very poor, please provide a reason for the low evaluation.

_____

_____

_____

V. FUTURE NEEDS

Please describe below the access you feel you need to computer equipment, programs and support in the future.

Computer Programs: _____

_____

_____

_____

Computer Equipment: _____

_____

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_____

_____

Support Services: _____

_____

_____

_____

What computer related needs do you currently require that are not being satisfied?

_____

_____

_____

_____

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Appendix C. ADMINISTRATIVE COMPUTING DEPARTMENTAL SURVEY

The following pages contain the Administrative Computing Departmental Survey used to gather additional information about administrative computing needs at the college.

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APPENDIX C

COLLEGE OF DUPAGE

INSTITUTIONAL PLAN FOR COMPUTING

ADMINISTRATIVE COMPUTING DEPARTMENTAL SURVEY

*DEPARTMENT:*_____ *DATE:* _____

*INTERVIEWEE:*_____ *INTERVIEWER:* _____

I. **Terminals / Printers to Mainframe/Mini Computers**

Please identify the number of additional terminals / printers that are needed to provide your department with an adequate level of support over the next three years.

No.Terminals	Type of Terminals (IBM 3278,3279)	Printers (IBM 3287,3812)	System Connection (IBM, Wang, HP 3000)	Access to: (CDAS,CMS)

Explanation of Use: _____

II. Micro Computers

Please identify the number of additional microcomputers that are needed to provide your department with an adequate level of support.

No. Micros	Type (ie. IBM PC, XT, Apple)	Mainframe Access (Yes or No)	Printer
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Explanation of Use: _____

_____

_____

_____

_____

III. Current Computer Administrative Applications - Usage Projections

Below is a list of computer applications currently available on the mainframe. If your department is responsible for the system please project your percent increase in records, ie. number of students, number of courses, number of transactions, for on-line use for the next three years. This also includes new information that is not currently stored on the system. We will need to justify maintaining the information on-line.

	Current No. of Records	% Projections-FY 1988	1989	1990
A. General Accounting System(CLAS/GLS)				
Purchase Orders - 5 years	195,000	___	___	___
Vendors	20,000	___	___	___
Accounts - 5 years	79,000	___	___	___
Journal Entry/Cash Receipts - 5 years	123,000	___	___	___
Invoices - 5 years	177,000	___	___	___
B. Fixed Assets Inventory System (INVS)				
Inventory	23,000	___	___	___

C. Human Resource Systems	5,000	___	___	___
D. EZ-List (Mailing List System)				
Members	387,000	___	___	___
Lists	1,100	___	___	___
E. Student Financial Aid System (CDAS/BR)				
Master File - 3 years	31,000	___	___	___
F. Student Billing and Receivables(CDAS/BR)				
Subcodes	1,300	___	___	___
Master Detail FIle - 6 quarters	1,200,000	___	___	___
G. Student Records System (CDAS/SR)				
Class Roster - 10 quarters	8,500,000	___	___	___
Course Inventory	8,200	___	___	___
Course Term - 3 years	50,000	___	___	___
Student Term - 3 years	332,500	___	___	___
Student Key - 6 years	225,000	___	___	___
Codes (Major/Pub Comment	2,400	___	___	___
H. DuPage Administrative				
Signons/Dictionary	1,500	___	___	___

IV. New Mainframe Computer Application Projects

Please identify the IBM mainframe computer applications or systems that are needed by your department that are currently not available. These will be rough estimates.

Applications	No. of Records	Size Each Record

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V. **Support Projections**

If you feel you did not receive adequate support from personnel in Computer Services, please identify the areas of concern and what is your recommendation on improving service.

_____

_____

_____

_____

_____

_____

_____

VI. **Future Computer Support Areas**

Please check each area where your department would be interested in using the following new application(s).

_____ Graphics - computer generated charts and graphs

_____ Electronic mail - send messages and mail to staff (inter-office and intra-office communications)

_____ Text Management - create, update, store, archival of document

_____ High quality text printing

_____ Report writing

_____ Statistical analysis

_____ Data management

_____ Project management

_____ Other _____

VII. **Current and Future Connectivity Needs**

Please check each area where you feel you will need to share or distribute information between computer systems.

_____ IBM mainframe to Lanier

_____ Lanier to IBM mainframe

_____ Lanier to Wang

_____ Wang to Lanier

_____ Wang to IBM mainframe

_____ IBM to Wang

_____ Microcomputer links to other microcomputers (Local Area Networks)

_____ Physical communication links among the Fine Arts Center, IC Building, the SRC Building, Open Campus and the Regional Centers/Satellite locations

_____ CLSI system access - COD library system

_____ Access to computer networks (ie. BITNET,ARPNET,VNET,TELENET,TYMNET)

_____ Other _____

Explanation: _____

_____

_____

_____

_____

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June 3rd, 1987

Appendix D. ACADEMIC COMPUTING DEPARTMENTAL SURVEY

The following pages contain the Academic Computing Departmental Survey used to gather information about academic computing needs at the college.

June 3rd, 1987

COLLEGE OF DUPAGE

INSTITUTIONAL PLAN FOR COMPUTING

ACADEMIC COMPUTING DEPARTMENTAL SURVEY

*DEPARTMENT:*_____ *DATE:* _____

*INTERVIEWEE:*_____ *INTERVIEWER:* _____

I. Student Usage of Computers

For each of the Instructional areas below please identify the projected increase in students that will use computers for 1988-1990. Also, indicate the type of computer that these students will use.

Instructional Area	Current	Number of Students % Projected 1988	1989	1990	Type of Computer

June 3rd, 1987

II. Faculty Use of Computers

Please indicate the projected increase in the number of computer stations by type of computer that needs to be purchased for faculty use over the next three years.

Total No. of Faculty	Number of Stations 1988	1989	1990	Type of Computer
_____	___	___	___	_____
_____	___	___	___	_____
_____	___	___	___	_____

III. Software Budget

Please indicate the amount of money you have budgeted for software in FY87 and a projected percentage increase for the next three years.

Current Budget	% Projected Increase 1988	1989	1990
$_____	___%	___%	___%

Are funds allocated for the preview of software? (Yes_____ No_____).

If yes, how much money? _____

What percent of the software budget do you estimate is allocated to buy software for student use? _____

IV. Computer Labs

A. What are your plans for expansion or upgrade of the lab you manage? _____

_____

_____

_____

_____

B. How can the lab be improved? _____

_____

_____

_____

_____

V. Support Projections

Do you feel you receive adequate support from personnel in Computer Services for instructional use of computers? Please identify any areas of concern and what is your recommendation on improving service.

_____

_____

_____

_____

_____

_____

_____

VI. New Academic Computer Applications

Please identify the academic applications or systems that you would like to see in use over the next three years.

Application	Type of Hardware	Type of Software (If possible to list)	Year of Use 1988	1989	1990
_____	_____	_____	____	____	____
_____	_____	_____	____	____	____
_____	_____	_____	____	____	____
_____	_____	_____	____	____	____
_____	_____	_____	____	____	____
_____	_____	_____	____	____	____
_____	_____	_____	____	____	____

June 3rd, 1987

Appendix E. COMMUNITY COLLEGE SURVEY

The following pages contain the Community College Survey used to gather information about computing at community colleges for incorporation into the plan.

June 3rd, 1987

RETURN BY OCTOBER 10, 1986
IN THE ENCLOSED ENVELOPE

COLLEGE OF DUPAGE

INSTITUTIONAL PLAN FOR COMPUTING

COMMUNITY COLLEGE SURVEY

COLLEGE: _____ *DATE:* _____

NAME: _____ *TITLE:* _____

STUDENT HEAD COUNT-FALL 86 _____ *NO. FULL-TIME FACULTY:* _____

I. **Management**

What is the total number of support staff (FTE's) for Academic and Administrative Computing. Please include all areas at your institution that support computing. This includes lab aides, lab supervisors and individuals supporting faculty and students.

Please breakdown support staff into the following categories:

Positions	Academic	Administrative
Management/Coordination	_____	_____
Operations, include Computer Labs	_____	_____
Application Programmers	_____	_____
System Programmers	_____	_____
Total	_____	_____

On the total for Academic Computing, please specify the percentage for faculty support: _____%

Who does your Academic Coordinator, Manager, Director report? Title: _____

Who does your Administrative Coordinator, Manager, Director report? Title: _____

Who is responsible for the telephone system on your campus? Title: _____

Who does he report to? Title: _____

II. Computer Equipment

Mainframe/Mini Configuration

CPU-Model	Memory(MB)	DASD(MB)	No. Stations Connected	Functions (Academic/Administrative)
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Breakdown of Computer Stations

Specify the number of micros/terminals in Academic and Administrative Computing

Type	Academic	Administrative
Micros		
IBM PC or compatibles	_____	_____
Apple II, Apple IIe	_____	_____
Macintosh	_____	_____
Other_____	_____	_____
Mainframe/Mini		
IBM 3270 Type	_____	_____
ASCII Terminals	_____	_____
Other_____	_____	_____

June 3rd, 1987

Computer Lab Configuration

Please list for each individual computer lab the type and number of micros and the department responsible for the lab.

Lab Description	No. Support Staff(FTE)	No. of Stations	Type of Stations	Department Responsible
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Do you have any plans for lab expansion? _____

_____

_____

_____

Number of students using computers: _____

Number of Micros dedicated to faculty: _____

Please provide a percentage breakdown of computer use by students and administrative staff for each of the following types of computers.

Type	Academic % (Students)	Administrative % (Staff)
Micro-Computer	_____	_____
Mini-Computer	_____	_____
Mainframe Computer	_____	_____

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III. Budget Information

Computer Services Operating Budget $_____

Academic $_____

Administrative $_____

Breakdown of Computer Services Budget by Categories

Hardware ____%

Software ____%

Staff ____%

Communications ____%

Other ____%

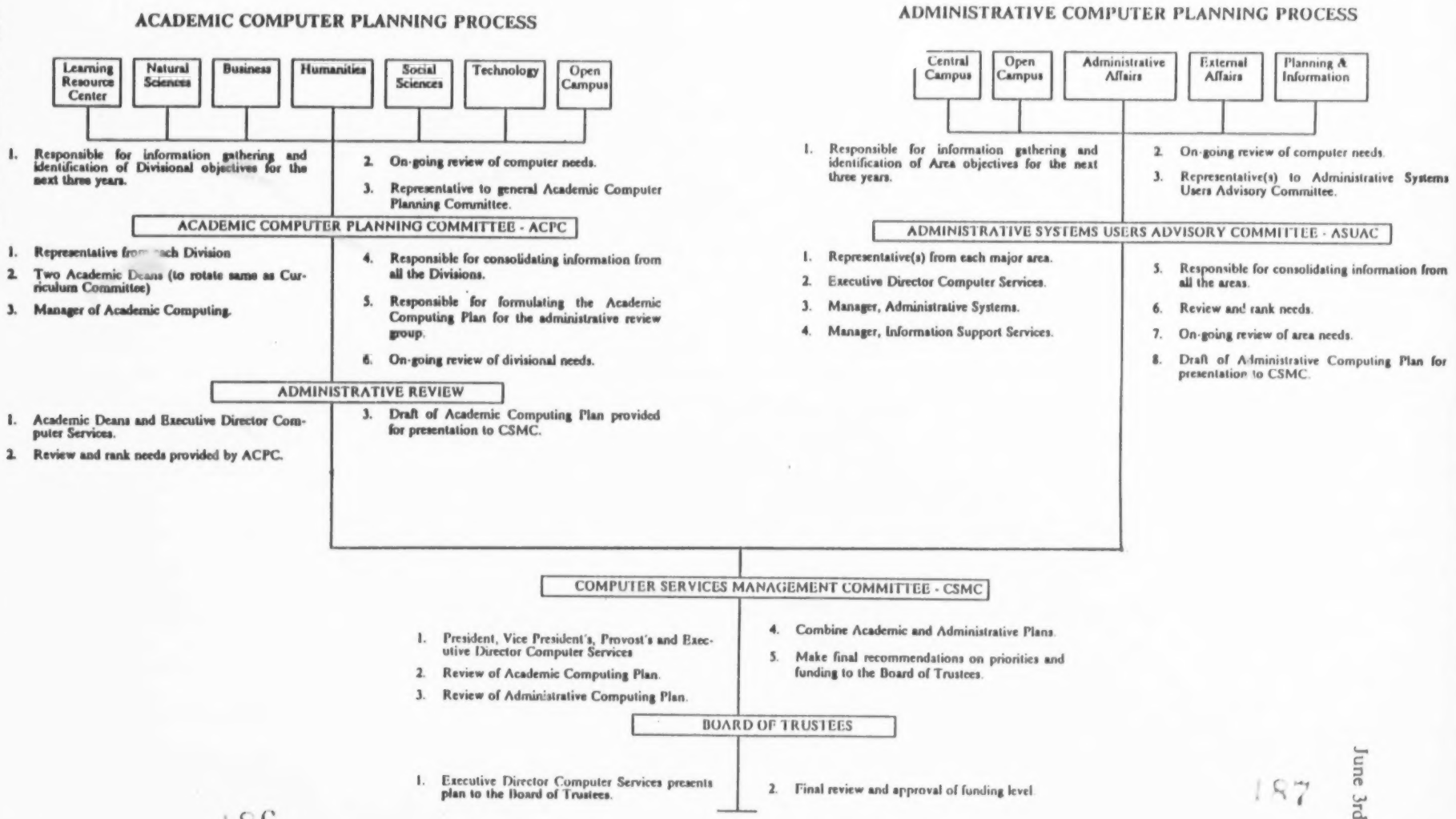
What is the total operating budget for your institution? $ _____

June 3rd, 1987

Appendix F. INSTITUTIONAL PLANNING PROCESS

COLLEGE OF DUPAGE

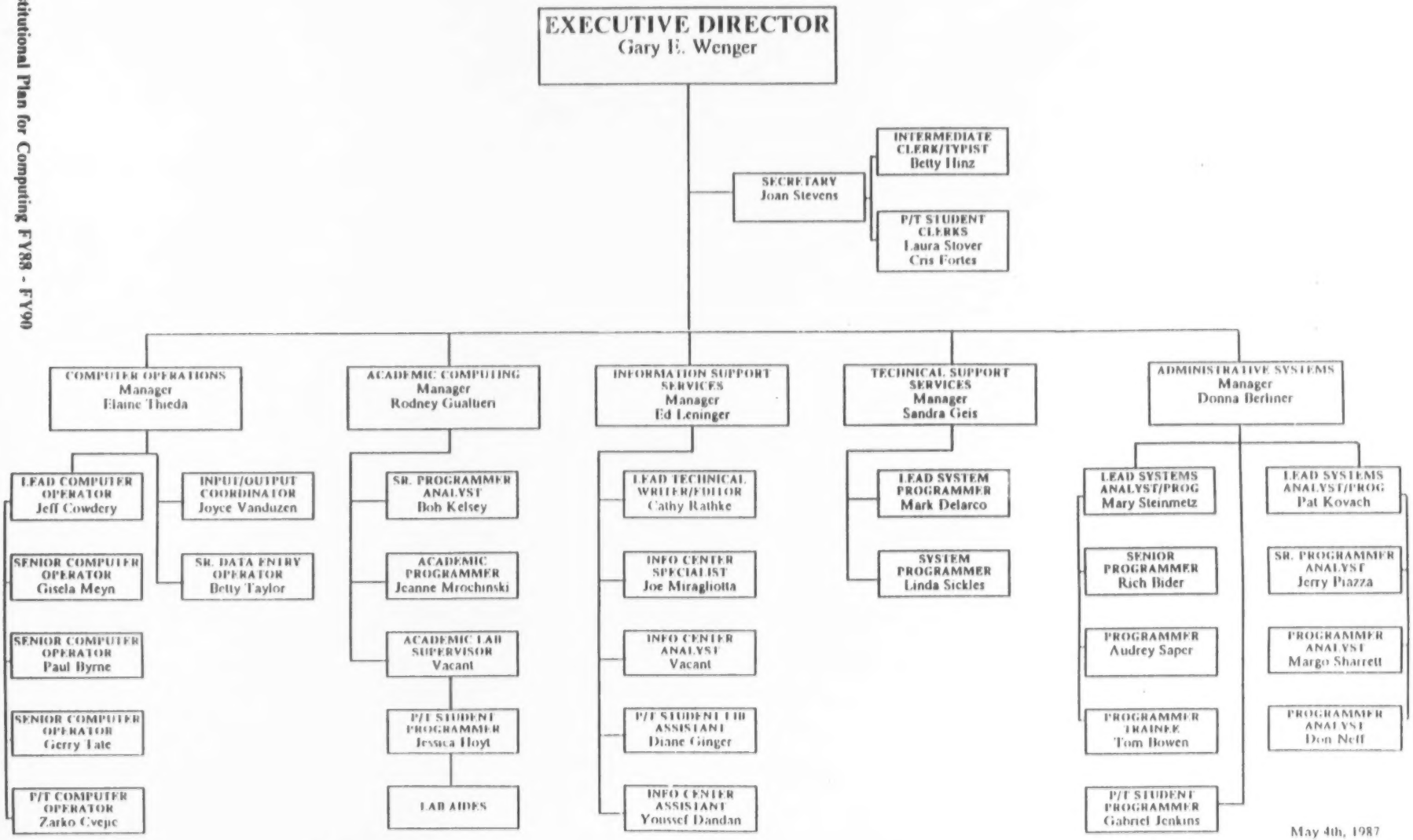
INSTITUTIONAL PLAN FOR COMPUTING


ACADEMIC COMPUTER PLANNING PROCESS
Learning Resource Center
Natural Sciences
Business
Humanities
Social Sciences
Technology
Open Campus
1. Responsible for information gathering and identification of Divisional objectives for the next three years.
2. On-going review of computer needs.
3. Representative to general Academic Computer Planning Committee.
ACADEMIC COMPUTER PLANNING COMMITTEE - ACPC
1. Representative from each Division
2. Two Academic Deans (to rotate same as Curriculum Committee)
3. Manager of Academic Computing.
4. Responsible for consolidating information from all the Divisions.
5. Responsible for formulating the Academic Computing Plan for the administrative review group.
6. On-going review of divisional needs.
ADMINISTRATIVE REVIEW
1. Academic Deans and Executive Director Computer Services.
2. Review and rank needs provided by ACPC.
3. Draft of Academic Computing Plan provided for presentation to CSMC.
ADMINISTRATIVE COMPUTER PLANNING PROCESS
Central Campus
Open Campus
Administrative Affairs
External Affairs
Planning & Information
1. Responsible for information gathering and identification of Area objectives for the next three years.
2. On-going review of computer needs.
3. Representative(s) to Administrative Systems Users Advisory Committee.
ADMINISTRATIVE SYSTEMS USERS ADVISORY COMMITTEE - ASUAC
1. Representative(s) from each major area.
2. Executive Director Computer Services.
3. Manager, Administrative Systems.
4. Manager, Information Support Services.
5. Responsible for consolidating information from all the areas.
6. Review and rank needs.
7. On-going review of area needs.
8. Draft of Administrative Computing Plan for presentation to CSMC.
COMPUTER SERVICES MANAGEMENT COMMITTEE - CSMC
1. President, Vice President's, Provost's and Executive Director Computer Services
2. Review of Academic Computing Plan.
3. Review of Administrative Computing Plan.
4. Combine Academic and Administrative Plans.
5. Make final recommendations on priorities and funding to the Board of Trustees.
BOARD OF TRUSTEES
1. Executive Director Computer Services presents plan to the Board of Trustees.
2. Final review and approval of funding level.

June 3rd, 1987

Appendix G. COMPUTER SERVICES ORGANIZATIONAL CHART

COLLEGE OF DUPAGE
COMPUTER SERVICES ORGANIZATIONAL CHART

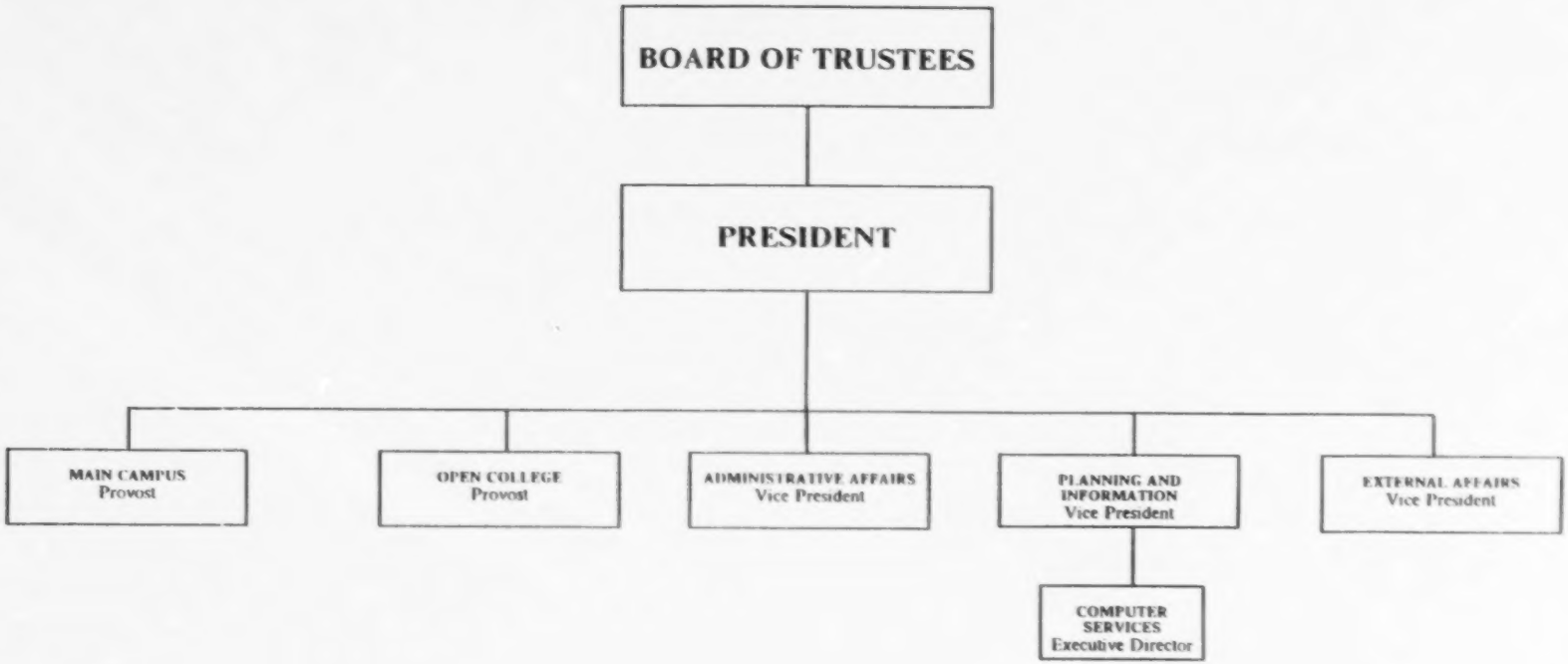


May 4th, 1987

June 3rd, 1987

Appendix H. INSTITUTIONAL ORGANIZATIONAL CHART

ORGANIZATIONAL CHART



Appendix I. COMPUTER RESOURCES SCHEMATIC

Computer Resources I

IBM 4381-P1

16 Megabyte Main Memory, 3.3 MIPS

Resource Totals

- Wang OIS 3274 Emulation
- Six 3274 Communication Control units
- One 3276 Communication Control unit
- One 7171 Protocol converter
- One 3705 Network Communication Control unit

- One 4245 Band printer (1800 lines per minute)
- Two 3812 Page printers (12 pages per minute)
- Eleven 3287 Remote printers
- One HP2689A Laser printer (45-180 pages per minute)
- One 6180-2 Graphics Plotter

- Eight 3370s
- Two 3380s

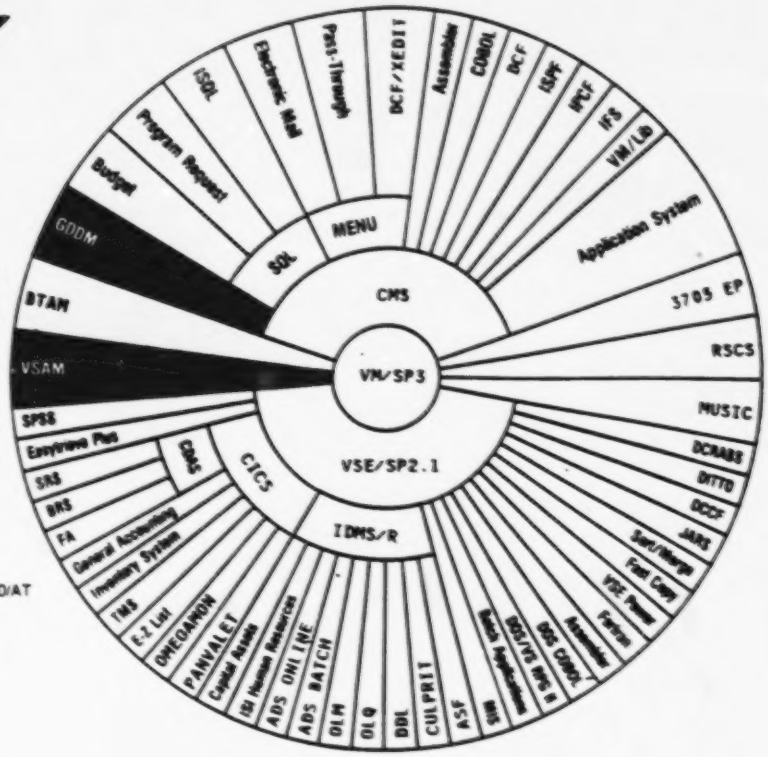
Approximately 10.0 gigabytes of disk storage
(1 gigabyte = 1 billion bytes)

- 160 Local Terminal ports
- 32 Wang OIS ports
- 62 Remote ports

Types: 3178, 3278, 3179
PC, PC/XT, 3270/PC, 3270/AT
ADM
Wang

- One 2821 Control unit
- Two 3880 Disk Control units

- Three 3420 Tape drives (2 MB/sec transfer rate)



Acronym Dictionary

ADS	Application Development System
ASF	Automated System Facility
BRS	Billing Receivables System
BTAM	Basic Telecommunications Access Method
CICS	Customer Information Control System
CDAS	College of DuPage Administrative Systems
CMS	Conversational Monitor System
COBOL	Common Business Oriented Language
DCF	Document Composition Facility
DCRABS	Disk Copy Restore and Backup System
DDL	Data Description Language
DITTO	Data Interfile Transfer Testing Operation
DOS	Disk Operating System
EP	Emulation Program
FA	Financial Aid
GDDM	Graphical Data Display Manager
IDMS/R	Integrated Data Management System Relational
IFS	Interactive File Sharing
IPCF	Interactive Problem Control Facility
ISI	Integral System Inc
ISPF	Interactive System Productivity Facility
ISQL	Interactive System Query Language
JARS	Job Accounting Reporting System
MIS	Management Information System
MUSIC	Magill University System for Interactive Computing
OLM	Online Mapping
OLQ	Online Query
POWER	Priority Output Writer Execution Processor Input Reader
RSCS	Remote Spooling Communications Subsystem
SPSS	Statistical Package for the Social Sciences
SRS	Student Record System
SQL	Structured Query Language
TMS	Tape Management System
VM/SP	Virtual Machine/System Product
VSAM	Virtual Storage Access Method
VSE	Virtual Storage Extended
VSAM	Virtual Storage Access Method

Color Key

- Languages and Utilities
- Operating Systems
- Application Programs
- Editors
- Communications Software and Monitors
- Data Bases
- Access Methods

College of DuPage

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